FEB 24 1921

Vol. XI FEBRUARY, 1921 No. 2

The Canadian Medical Association Journal

THE OFFICIAL ORGAN OF

THE CANADIAN MEDICAL ASSOCIATION

AND ITS AFFILIATED PROVINCIAL MEDICAL ASSOCIATIONS

PUBLISHED MONTHLY BY

THE CANADIAN MEDICAL ASSOCIATION, 836 UNIVERSITY STREET, MONTREAL

Lederle
BIOLOGICAL PRODUCTS

ARE INDISPENSABLE IN THE DIAGNOSIS PREVENTION AND TREATMENT OF DISEASE

Descriptive Price List on application to our nearest office

GONOCOCCUS GLYCEROL-VACCINE
STABLE and EFFECTIVE

Advantages: 1. Will not deteriorate. 2. Free from autolytic products. 3. No toxic reactions.

The types of cases reported to us as favorably influenced by Gonococcus Glycerol-Vaccine are chronic gonorrheal infections, including gonorrheal rheumatism, epididymitis, prostatitis and posterior urethritis.

Further information on request

LEDERLE ANTITOXIN LABORATORIES

464 St. Catherine St. West, MONTREAL
265 Portage Avenue, WINNIPEG

SEVENTY-FIVE CENTS THE COPY FIVE DOLLARS THE YEAR

How the Diarsenol Products are Tested

TESTING is a very important factor in the manufacture of safe, reliable arsenicals. To have confidence in them you should know to what rigid tests they have been subjected before reaching your hands.

(1) The license under which Diarsenol, Neodiarsenol and Sodium Diarsenol are made provides that they be tested by independent authorities appointed by the Hon. Commissioner of Patents. The authorities appointed to test our products are also recognized by the British Medical Research Council. Every batch is tested by them on mice, using the same standard as that adopted in England.

The following are the standards showing the margin of safety in the maximum human dose considering a man weighing 150 pounds.

Diarsenol - Mouse gets 0.125 gms per kilo equivalent to 8.75 gms for a man.

Neodiarsenol - Mouse gets 0.3 gms per kilo equivalent to 21. gms for a man.

Sodium Diarsenol - Mouse gets 0.18 gms per kilo equivalent to 12.6 gms for a man.

Margin of safety in maximum dose

Diarsenol	-	Maximum dose 0.6 grm	14 to 1
Neodiarsenol	-	" " 0.9 "	23 to 1
Sodium Diarsenol	-	" " 0.9 "	14 to 1

(2) In addition we have special standards of our own for solubility and color based on our long experience, which each batch must live up to. This, together with expert supervision in manufacturing is an important factor in detecting faults before the products are packaged. After being put in ampoules each one is tested for imperfections. Many batches and ampoules have been rejected for each of these reasons. Therefore when using any of the above products, of such unquestioned value, you may rest assured that every precaution possible has been taken to safeguard you and your patient.

SYNTHETIC DRUG CO. LIMITED

TORONTO TRADE MARK **CANADA**

The Canadian
Medical Association Journal

VOL. XI. TORONTO, FEBRUARY, 1921 No. 2

ON THE TREATMENT OF ACUTE EMPYEMA

A. T. BAZIN

Assistant Professor Surgery, McGill University; Surgeon to the Montreal General Hospital

MR. PRESIDENT: I assure you I am deeply appreciative of the honour of appearing before you to deliver the Address on Surgery. It is no less a privilege than a responsibility, and I confess that I thought long and seriously before deciding upon a subject for presentation. I trust my choice will be acceptable to you and that I may be forgiven for confining myself to what might better be termed a "paper", rather than the grander title for which I am given credit on the programme.

My reasons for choosing acute empyema are:

1st. It is a world-wide disease, affecting all ages, both sexes, all classes of society and in all climates.

2nd. Its treatment has been the subject of debate and difference of opinion for years, and of late has demanded the "spot-light", because of the large increase in numbers of cases during the influenza epidemics.

3rd. The experiences in thoracic surgery during the war have had a definite influence upon the treatment of empyema, according to the manner in which these experiences have been interpreted.

4th. It is a disease which results in a considerable economic waste in mortality, or disability, temporary or permanent.

5th. It is of interest alike to the physician and to the surgeon.

It is not my intention to exhaust the whole subject of empyema, but to deal only with a review of the treatment of the common every-day cases seen so frequently by all of us.

An address before the Saskatchewan Medical Association, July 6th, 1920.

For all practical purposes, empyema may be defined as an infection of a pleural effusion, secondary, in almost every instance, to a pulmonary lesion. This pulmonary lesion may be only a bronchitis, but it is usually a pneumonia, and empyema is its most common complication or sequel. This is the type of which I would speak.

As there are two types of pneumonia, *i.e.*, lobar and lobular (or broncho-) pneumonia, so there are two types of empyema which complicate these pneumonias. Not only do the types run parallel along clinical lines, but also along bacteriological findings.

Lobar pneumonia is a primary disease with sudden onset in an individual previously healthy. The complicating empyema appears, as a rule, late, when the lung infection is subsiding or has subsided. The infecting organism is one of the pneumococci.

Lobular or broncho-pneumonia is usually an infection of the lung secondary to infection elsewhere; it may be a pharyngitis, a laryngitis or a general infection such as one of the exanthemata or an influenza. The complicating pleural infection appears early in the course of the disease, while the lung infection is still active. The infecting organism is most frequently a streptococcus either hæmolytic or non-hæmolytic.

In the epidemic type in Armies the incidence of empyema in lobar pneumonia is only about 17 per cent., in non-hæmolytic streptococcal infections about 10 per cent., but in hæmolytic streptococcal infections it is 50 per cent. The mortality rate in all is high, varying from 10 to

50 per cent. in different series studied, hence the disease is well worth our serious consideration.

The different methods of treatment may be classed as follows:

1. Simple aspiration with or without injection of chemical bactericides.
2. Puncture drainage—supposedly air tight and with continuous or intermittent negative pressure drainage.
3. Thoracotomy for continuous drainage with or without irrigation of some sort.
4. Thoracotomy and thorough mechanical cleansing of the pleural cavity with immediate air-tight closure of the wound followed by repeated aspiration.
5. Rib resection (costectomy) for continuous drainage.

All of these methods have, or have had, their advocates who shew longer or shorter series with a high percentage of cures. Let us endeavour to produce order out of this seeming chaos.

To begin with—what is the ideal result aimed at?

1. The saving of life.
2. The restoration of function.

The function of the pleural membrane is to permit the free movement of the lung in the act of respiration. Therefore, thickening of the membrane covering the surface of the lung and limiting its expansion, as also permanent adhesions which bind the parietal and visceral layers together, limiting contraction, must be considered as falling short of a complete restoration of function.

But as in other serious cavities, the peritoneum as a common example, adhesions are protective and aim at the delimiting of the disease. Obliteration of any pus cavity in either pleural or peritoneal sacs must take place because of adhesion of the walls. These adhesions are at first unorganized lymph. In the presence of continued irritation, bacterial, chemical or mechanical, this lymph becomes organized fibrous tissue and the adhesions are then permanent. If the irritation be promptly removed, the lymph is absorbed and the normal endothelial surfaces are restored.

In empyema there are two factors to be considered:

1. A toxæmia from absorption.
2. Mechanical interference with respiration and cardiac action.

In dealing with toxæmia it must be borne in mind that the pleural infection may be only one and perhaps a comparatively unimportant focus from which absorption is taking place. Undoubtedly, at the beginning the more important focus is the pulmonary infection, and in many instances it is not improper to consider that the pleural effusion, infected though it may be, is of benefit in many ways. It relieves the pain of respiration by separating the two pleural surfaces and thus conserves strength. By pressure upon the lung it affords the latter a degree of functional inactivity which we all recognize as being a great factor toward the recovery of any tissue from injury or disease.

It cannot be denied that many infected effusions spontaneously disappear. That these effusions are bactericidal to a greater or less degree is established as a fact. It is only when they become "stale" or devitalized either through age or through destruction by the toxins of virulent organisms that they become the nidus or culture medium for the propagation of the infecting agent.

It is rational then to adopt a plan of treatment which removes the devitalized effusion and permits of a fresh supply being thrown out.

But the development of this protective effusion may pass "out of bounds" and by pressure interfere with respiratory and cardiac comfort. This pressure may, by displacing the mediastinal partition, seriously interfere with the movements of the other lung, and by similar, and often coincident, displacement of the heart and pericardium, cause kinking of the great veins and embarrassment of the circulation.

In such cases aspiration is demanded. In my opinion, simple aspiration meets all the indications. The refinement of replacing the fluid with an equal amount of oxygen or other absorbable gas is unnecessary. By removing the fluid slowly the dangers of a sudden lessening of pressure are avoided and the pericardium and mediastinal partition are permitted to resume normal position without inconveniencing the patient. Nor is it necessary to use this procedure in order to remove every ounce of fluid. As indicated above, the presence of a reasonable amount of effusion is beneficial.

A word as to the technic of aspiration or exploration. Inasmuch as exploration or aspiration may have to be repeated at short intervals, it is not only humane, but advisable that the procedure should be made painless. The use of a local anæsthetic injected with a very fine needle and infiltrating all layers including the periosteum of the rib, the intercostal nerve and the parietal pleura, consumes but a few minutes. More im-

portant than the relief of pain, the local anæsthesia prevents that unusual but serious complication, "pleural shock". Because of the presence of flakes of lymph in the effusion, it is necessary that a large needle be employed, or better still, a trocar and cannula which may be cleaned by inserting the plunger should a block occur. The introduction of the needle should be preceded by the puncture of the skin with the point of a sharp tenatome or Græfe's knife. This not only prevents the possible punching out of a portion of skin by the needle, blocking the latter, or the conveying of skin infection into the pleural cavity, but permits of a much more rapid healing of the puncture wound.

And, lastly, all connections must be air tight, otherwise a pneumothorax is apt to be produced which confuses the diagnosis of the development of the case.

Not only is aspiration indicated in this class of case, but operation is definitely contraindicated.

Open operation by producing pneumothorax permits of atmospheric pressure being constantly exerted against the mediastinal partition with consequent embarrassment of the other lung and of the circulation.

Closed operation with negative pressure drainage is also bad. True, it removes the devitalized effusion and stimulates the constant production of fresh effusion of bactericidal power, also promoting lymph and serum drainage from the pleural tissues, but it negatives that mechanical and functional rest which an effusion affords to the acutely infected lung, and we have stated that such rest is beneficial.

But the case progresses—the pulmonary infection is subsiding and the pleural infection is gaining in comparative importance. Delimiting pleural adhesions form which fix the lung to the parietes, leucocytes hasten to the region and in the phagocytic battle fall dead or wounded in large numbers, thus constituting what we call pus. In other words, there develops a pleural abscess.

Similar to all infectious processes elsewhere the appearance of a localized collection of pus is indicative of a strenuous resistance being put up by the tissues and by the individual. It means the development of a local and general immunity to the infection and as such must be considered as a favourable prognostic sign.

It is the proper treatment of this pleural abscess which has called forth so much variance of opinion.

Inasmuch as these patients have passed through a severe illness, taxing their strength and powers of resistance it is of advantage to adopt such treatment as will require a minimum of disturbance.

Furthermore, as many of these cases cannot secure hospital treatment nor even the attention of a trained nurse it is essential that the treatment should be simple and under the control of the attendant on his daily or more frequent visits.

The cure should consume a minimum of time, otherwise the continued presence of bacterial irritation promotes the formation of fibrous tissue on the visceral pleura, binding down the lung and preventing its expansion. This is the real anatomic reason of chronic empyema, the relief of which so taxes the resources of surgeons and which so frequently results in grave disability.

Let us consider how the various plans of treatment meet these indications.

Aspiration. Simple enough, and under the control of the medical attendant. But does it effect a cure with the best functional results?

Many of the post-pneumonic cases unassociated with fever shew few symptoms of illness beyond the physical signs in the chest. In these cases there has been established a general immunity to the infection or else there is no absorption taking place from the cavity. Examination of the pus usually shows a very active phagocytosis and it may be with difficulty that culture can be obtained of the organism.

In such instances it is a temptation to use the needle to remove what is apparently an almost inocuous fluid. That this results in cure in some cases cannot be denied, but that it most frequently fails is the lesson of experience, and in the interval important time has been lost.

It is our friends the physicians who naturally err most frequently in this direction. They see with satisfaction the results of the successful cures by aspiration, but the failures are passed on to the surgeon who does the worrying over the slowly healing and persistent cavities.

Now is it reasonable to expect aspiration to cure any but the occasional case? Firstly, examination of the pus is not a true indication of the vitality of the infecting organism. In the pus one gets only the casualties of both forces—leucocytes and bacteria thrown out of the front line which is situate in the pleural tissue.

Secondly, here is a collection of real pus—an abscess—and one with constantly moving walls. Any abscess anywhere and everywhere must heal by obliteration of its cavity and adhesion of the

walls, hence drainage and rest. The pleural abscess is no different from abscess elsewhere.

Moreover, the needle cannot remove the coagulated lymph which is constantly present frequently in large mass. The advocates of aspiration will tell you that this mass liquefies. What liquefies it? The proteolytic action of the leucocytes and of the infecting organism. But if the infecting organism has lost its activity and there is in consequence but little leucocytosis, the clot remains and becomes organized with the formation of dense permanent adhesions. True, the empyema is cured, but permanent limitation of the pleural function persists.

The injection of solutions in the endeavour to dissolve the coagulum is sometimes used. It is conceivable that proteolytic ferments would be efficacious, but the dangers of secondary infection are present, as these ferments are destroyed by all methods of sterilization. The citrate solutions which *prevent* the coagulation of albuminous fluids are of absolutely no avail in liquefying a clot once formed. The injection of chemical bactericides not only deters liquefaction of the clot, but by adding irritation assists in the formation of further fibrous tissue on the surface of the pleura.

Puncture Drainage with Negative Pressure. This method also falls short of the indications in that it does not remove the coagula. It furthermore entails an enormous amount of attention and care on the part of the nursing attendants, and like all mechanical devices, does harm if it is not perfect in all its details.

For the past two decades there has been presented from time to time a technic and apparatus modified to overcome certain weak points in this method, such as leakage round about the drainage tube, blocking of the tube with coagulum, manometer measurement of the degree of vacuum pressure and the maintenance of a continuous rather than an intermittent negative pressure. In the hands of the enthusiastic originators, these apparata give excellent results, but by the great body of surgeons they have been tried and discarded as not productive of results worth the labour entailed.

Thoracotomy and thorough mechanical cleansing of the pleural cavity with immediate air-tight closure and subsequent repeated aspiration. Theoretically, this method appeals. It apparently came into vogue as the result of the war experiences with wounded chests. Unfortunately, it more frequently fails than succeeds. With wounds of the chest with hæmothorax it is known that:

A. Sterile hæmothorax, if large, the clot should be removed by open operation, because the presence of blood clot stimulates formation of organized fibrous tissue and permanent adhesions.

B. Infected hæmothorax should be treated by open operation and removal of all clot as the clot is a focus of mass infection.

In both instances there should be immediate air-tight layer closure of the wall and repeated aspiration of the effusion which may accumulate. But there is no parallel between these cases and empyema. In the infected hæmothorax the infection comes from without and by excision of the track of the missile and the removal of the clot, almost all the infecting organisms are removed. The pleural tissues are healthy and capable of destroying the small amount of infection remaining.

In empyema, however, the cleansing of the pleural cavity does not remove the source of the infection at all. It is the pleural tissue which is the site of the active infective process and not the contents of the pleural cavity. Moreover, it is difficult to get a closure which remains tight, as the pleural surface which is sutured is not healthy as in wounds of the chest, but is œdematous and infiltrated and itself infected and liable to break down.

Injections and Irrigations. Chemical bactericides of various kinds have been used as injections and irrigations, continuous or intermittent, with the idea of sterilizing the cavity and thus getting rapid closure.

A full discussion of this point would open up the whole question of the treatment of infected wounds and localized infections. It suffices to repeat that in empyema the seat of active infection is in the pleural tissues and not in the cavity; and to point out that the use of chemicals adds irritation to the already irritated pleural membrane and tends to promote the formation of thick layers of organized fibrous tissue. There is no exception—Dakin's solution is the last one to fall under the ban.

In instances of foul putrefactive pus it is permissible to flush out the cavity in order to mechanically cleanse it of decomposing masses of lymph sticking to the wall. Normal saline meets all the requirements and is not harmful.

Rib Resection with Continuous Drainage.—Technic. By physical signs, *x*-ray and needle exploration, the lowest point of the abscess is defined and the rib immediately above is chosen for resection. The site of election is a point midway between the posterior axillary line and the scapular

line. The position of the patient is a semi-prone one, the affected side uppermost with the shoulder and hip supported and the arm hanging straight down over the side of the table. The other arm is placed behind the patient and parallel to the trunk. This position exposes the field; draws the latissimus dorsi muscle well up and gets the scapula out of the way. There is no undue pressure on the normal side and the supports to shoulder and hip permit of thoracic and abdominal respiration being carried out without difficulty.

Local anæsthesia is used—novocaine 1 per cent. with adrenalin, preceded half-an-hour by a hypodermic of morphia to quiet distressed respiration.

The infiltration is completed prior to the skin incision being made as it is easy to infiltrate succeeding layers to the periosteum and then with the point of the needle enter the space between the two intercostal muscles and deluge the intercostal nerves above and below.

The incision is made over and parallel to the rib dividing the overlying muscles with sharp strokes of the scalpel between spasmodic contractions.

The periosteum is stripped in the usual way and one to one and a half inches of rib removed. Any bleeding points are carefully secured.

The point of the scalpel then enters the cavity followed by a director, and the pus is allowed to escape slowly. Enlargement of the opening is made with the scalpel from time to time as the flow of pus lessens. Finally the size of the opening is increased to the entire length of the resected field.

The finger is inserted and the cavity explored to define its boundaries. If bands of adhesions are present these are broken down to merge all pockets with the main cavity.

Loose coagula are removed by fingers or forceps and the cavity sucked dry.

Dry gauze swabs in curved forceps are used to gently curette the entire surface of the cavity, removing loosely attached lymph clot.

This frequently induces bloody oozing which is of no moment.

The manipulations with finger and gauze excite violent coughing which not only helps to expel fluid and coagula, but in recent cases expands the lung to completely fill the cavity.

A rubber drainage tube of large size is inserted and fixed to the skin margin with a silk worm gut suture. Partial closure of the superficial wound and applying massive dressings complete the operation.

A few comments on points in the technique may not be amiss.

If on resection it is found that the margin of the cavity extends below the level of the opening by more than one inch, a portion of the rib below should be removed It is essential for the best results that the drainage should be from the lowest point of the cavity.

The incision parallel to the rib requires division of fibres of the latissmus dorsi, but only of its lateral margin. The incision at right angles to the ribs, splitting the latissmus dorsi and widely separating it to allow of deeper incision parallel to rib has no advantage in securing better ultimate function of the muscle and has the disadvantage of exposing a much larger area to infection and cellulitis.

Infection of the superficial tissues follows in almost every case but does not spread, provided no attempt has been made to close the wound. The only closure permissible is that obtained by one or two sutures leaving open spaces for drainage.

The drainage tube should be large, but only of sufficient length to pass through the thickness of the wall. The tube should be soft, in order to prevent injury by it to the lung. For this purpose the end should be trimmed square, a lateral opening cut half-an-inch from end and then the whole tube cut from end to end in a spiral. This converts the tube from a rigid to a flexible one.

Rib resection has, in my opinion, every advantage over thoracotomy between the ribs:

1st. The rib is a definite structure to determine the depth of incision.

2nd. All bleeding can be secured before pus is allowed to flow and it permits of gradual enlargement of the opening into the cavity by cutting through avascular tissue rather than through muscle fibres.

3rd. It affords sufficient space for exploration and drainage without the use of retractors to widen the space; and, with local anæsthesia traction on the tissues is not permissible.

The incision between the ribs takes less time, but time is no object. Operation for empyema should never be an emergent one. If there are distressing symptoms of pressure or a severe toxæmia the case is not one for operation but for palliative aspiration, with radical operation to follow upon temporary improvement of the patient's general condition.

After Treatment. The patient is put to bed and propped up to ensure dependent drainage. The degree of inclination is adjusted to meet the amount of myocardial weakness which may be present. But the position is important inasmuch as if some portion of the cavity be lower than is the drainage point pus may collect, be walled off by adhesions and require a second operation for its evacuation.

Dressings are changed or re-inforced as often as the discharges soak through. The dressings should cover a wide area and be firmly applied to avoid the possibilities of a secondary infection.

On the second day the tube should be replaced by one much smaller or, if the amount of discharge be small, it may be left out altogether.

From this time on daily dressings should be done at which time the patient should be directed to cough forcefully. Small pieces of coagulum may present at the wound and require removal. Unless these come away the wound will not heal promptly. At each dressing distinct sucking through the wound should be demonstrated and ensured. by passing into the cavity a forceps or director permitting the escape of any accumulated fluid. The director is thus used until no track remains, or no fluid escapes, or the fluid changes to clear serum.

At times the amount of fluid accumulating between dressings is so large, 10 to 20 drams, as to warrant the insertion of the smallest rubber tube for a day or two.

The patient is allowed up and about and encouraged to use the blowing bottles as soon as his general condition will permit.

A high calory diet should be given to recompense for the high proteid waste of the exudate.

The *x*-ray is valuable, not so much as an aid in diagnosis, but as a means of watching progress after operation and to determine the presence of localized pockets.

In cases which are promptly recognized and brought to operation the discharge ceases in about ten days at which time the patient is quite convalescent and there is no asymmetry of the thorax. The lung is completely inflated and there is no shadow suggestive of thickened pleura.

Years ago it was demonstrated that when the air met with more resistance in entering the pleural cavity through the wound than in entering the lung through trachea and bronchus a pleural negative pressure was established with each inspiration. In this method of treatment the above conditions are established promptly upon the removal of the large tube on the second day.

Summary

Infected pleural effusion should be treated by simple aspiration and not by operation.

Frank pus in the pleural cavity is an indication that an abscess, large or small, has been walled off by adhesions, that local and general immunity to the infection is being established and operation is indicated without further delay.

The operation best suited for all cases is resection of rib over the most dependent portion of the cavity, exploration and gauze curettage of the walls, continuous drainage and early removal of drain. By this means a cure with complete expansion of the lung is effected in from eight days up, according to the period of time between the appearance of pleural abscess and operation.

Radical operation is not an emergent treatment to meet urgent symptoms. These should be relieved by aspiration, and operation delayed.

Early diagnosis and prompt treatment of acute empyema will reduce to an irreducible minimum the condition known and feared as chronic empyema.

THE TRAUMATIC ABDOMEN

ROWLAND F. WEBB, M.B., F.A.C.S.

Grand Rapids, Michigan

WHEN beginning as intern in a large industrial hospital, it occurred to me that many who were injured about the abdomen were lost that might otherwise have been saved by early exploratory and by doing whatever surgical procedure was indicated. There are many excuses, however, for conservative surgery because it is not always easy at the onset to convince one's self that a real injury has taken place within the abdomen.

The history and nature of the injury should be the governing factor at all times. The abdomen may have received a severe injury and great damage be done within the abdominal cavity, with little or no external evidence. To wait in these cases for the length of time taught by most writers, before intervening by exploratory laparotomy, will often make it too late to interfere at all. For example, a man is brought to the operating room injured in the abdomen by a piece of flying board thrown rapidly and with great force from a machine. There may be no evidence of abdominal injury either external or internal except a slight nausea and abdominal pain about the umbilicus. There may or may not be muscular rigidity. Shock may or may not be present, but on exploratory laparotomy visceral damage needing immediate repair is usually found.

The cases which have come under my observation may be divided into those which present evidence of external injury and those which do not present any external injury whatsoever. The former class may vary in degree from an abrasion of the skin to a complete rupture of the abdominal wall. The degree of the internal injury is not always dependent upon the degree of the external injury. In the latter type where no external wound or break in the skin occurs, the internal injury may be equally as severe, as in those injuries with the most extensive external wounds.

Read at the fifty-first annual meeting of the Canadian Medical Association, Vancouver, June, 1920.

Report of Cases.

1. C. Man, age twenty, was struck in the abdomen by a board thrown from a rip-saw. Entered hospital one hour later with pain in the neighbourhood of the umbilicus, slight rectus rigidity, no nausea or vomiting. The signs did not seem to demand operation, but from the nature of the blow we thought best to open up, and a rent was found in the ileum about one inch in length, which was closed over, and the abdomen closed. The patient got well.

2. R. Man, age thirty, was struck by board in the abdomen. Entered the hospital two hours later. The abdomen was not rigid and the patient had not vomited. He had slight nausea while in the ambulance. The right rectus muscle became rigid ten hours later, at which time the pulse and temperature were normal. We opened the abdomen and found a ruptured ileum with the abdominal cavity filled with escaped intestinal contents. The bowel was repaired and abdomen closed, leaving drainage. Localized peritonitis developed but the patient recovered. This man should have been opened at the very beginning.

3. A. Man, age twenty-five, struck in the abdomen by a flying board from a rip-saw. There were no physical signs of injury when the patient was admitted to the hospital a few hours later. The morning of the second day the patient became distended and I was consulted by the attending surgeon and was loath to advise against opening up the patient, but was forced to do so because the peritonitis was too far advanced for even a local anæsthetic. Two hours later the patient was dead and post mortem showed a ruptured ileum. Had this patient been operated when first admitted, I believe a complete recovery would have been the result.

4. K. Man, age thirty-one. Patient fell beneath rear wheel of three ton truck which caught against the left side of the chest, sliding and pushing the patient along in front of the wheel for several feet without passing over the entire body. The patient entered the hospital one-

half hour later. An examination revealed fracture at the anterior angle of the ninth and tenth ribs. The pulse and temperature were normal, but the patient had some abdominal pain, slight nausea, and stupor. We advised operation but the patient would not consent. Four hours later the picture had changed. There was now marked abdominal rigidity, more marked on the left, tenderness, rapid respiration, rapid feeble pulse, cold and clammy skin, with more stupor than at the beginning. The patient was finally persuaded to accept operation where upon opening the abdomen it was found filled tight with blood. A large extravasation of blood retroperitoneally was found to the left of the spinal column extending from the costal arch to the pelvis. The spleen was one large contused mass, with two lacerations on the medial surface, each three inches in length extending through half the thickness of the organ from which blood was pouring into the abdominal cavity. Spleenectomy was done for the control of the hæmorrhage. Blood transfusion was done while closing up and the patient travelled along the way toward recovery until the seventh day, when pneumonia developed, and he died on the tenth day.

5. A. Man, age twenty-eight. Caught between two freight cars. Brought to the hospital immediately where an examination showed marked evidences of hæmorrhage but no external injury was present. The abdomen was opened at once. We found a complete severance of the ileum with lacerated mesentery and mesenteric vessels. The abdomen was cleaned of intestinal contents and an end-to-end anastomosis was rapidly done. The bleeding mesentery was controlled and the abdomen closed while a blood transfusion was done. The patient was put to bed showing signs of improvement from the profound shock and hæmorrhage, but fours later he suddenly became worse and died within two hours. Post mortem showed that a ruptured mesocolic vessel had been overlooked and had bled the patient to death. Whether there was a temporary clotting of this vessel which we overlooked, I am unable to say. If so, it evidently began bleeding again following the blood transfusion. One should, of course, make every effort to control every bleeding point as well as repair all damage to the viscera.

6. R. Age twelve years. Boy accidentally discharged his twenty-two calibre rifle into his left rectus muscle, just above the level of the umbilicus. At the end of the first hour there were no apparent signs of visceral injury. At the end of the second hour, nausea, pain, rigidity, and tenderness had developed with a sudden sharp increase in the rate of the pulse and respiration. The abdominal cavity was explored and ten perforations of the small gut were found. The perforations were repaired by suturing; in addition a resection of a few inches of the jejunum was necessary. The abdominal cavity was cleansed, drained and closed. The patient developed some localized infection about the drain but made a complete recovery. I mention this to show how innocent the picture may present itself one hour and how grave the following hour.

7. B. Boy, age seventeen. Shot by pistol through the right epigastrium in the forenoon. Entered the operating room three hours later, when I first saw him almost entirely exsanguinated from an apparent internal hæmorrhage. We were censured by the physician who referred the case for our proposal to operate, but we infused in this semi-comatose patient 500 c. c. of normal saline and opened the abdomen. The abdominal cavity was full of blood clots, the rapid removal of which revealed the bleeding point to be from a rent in the portal vein. This we stopped with three hæmostats grasping the edges of the rent. The abdomen was closed, leaving the hæmostat through a small unclosed part in the upper angle of the incision. Blood transfusion was done. On the fourth day the hæmostats were removed. The patient made an uneventful recovery. I might add that the bullet pierced the lower edge of the right lobe of the liver near the round ligament The part of the liver below this wound sloughed a few days later.

Summary

I have mentioned a few of the more important cases to show the success that may be attained if operation be done early, as well as the failures that will be certain to come, if not done early. If you wait for the symptoms of hæmorrhage and shock to appear, it is indeed too late, and since early interference offers the only hope for the patient in case of severe visceral injury there is to be no question when in doubt as to operation. No harm can be done to the patient by the ordinary exploratory of the abdominal cavity even if there be no internal injury; but in case such injury is found it offers the only hope for the patient's recovery.

Since we have taken this stand in regard to

abdominal injuries we have encountered rupture of all the important abdominal viscera except the stomach. A total of twenty cases shows a rupture of the bowel in twelve cases, a rupture of the bladder in three cases, the liver in two cases, the kidney in two cases (each unilateral fortunately), and one case of rupture of the spleen. The ileum is the most common site of injury of the bowel.

The time of operation plays an important rôle in the prognosis as shown by our cases as follows: Nine cases operated within three hours after injury show an uneventful recovery except the one in which the bleeding mesocolic vessel was overlooked. Six cases operated after three hours following injury and before ten hours show only three recoveries with an equal number of deaths from hæmorrhage and peritonitis. Five cases operated ten hours after injury show recovery in but one case, that reported here.

May I again repeat with emphasis that there is no time to be lost in expectant treatment. No time to be lost in useless consultation; no time be lost in exploring. Open the abdomen if you believe there is the slightest chance of rupture of any of its viscera or vessels.

THE ACUTE ABDOMEN FOLLOWING ABDOMINAL OPERATION

GEO. E. SELDON

Vancouver, B.C.

THERE is nothing more heart-breaking to the young surgeon or at times disconcerting to the matured one than to have something go wrong within an abdomen following an abdominal operation.

If, in briefly discussing the post-operative conditions of vomiting, abdominal pain, distention and shock, I class them as distinct entities, risking the charge of dogmatism, I do so only to emphasize the fact that by carefully making a systematic study of the condition present, one can arrive at a diagnosis that will lead to rational treatment.

There were surgeons of the old school, who, when called in consultation, could diagnose an acute abdominal condition as if by intuition. These were men who profited greatly from having seen many similar conditions, and who paid great attention to bedside diagnosis. Possibly in certain cases they failed to make a correct diagnosis, but they knew when to reopen an abdomen and when to leave well enough alone. To-day, thanks to hospital standardization with clinical records, reports of special examinations, and more particularly notes on the operation and the findings made at the time of the operation, we can, by careful perusal of these data, often formulate in our minds the possibilities of the case.

Read at the fifty-first annual meeting of the Canadian Medical Association, Vancouver, June, 1920.

In addition to careful study of the history of the case, I wish to emphasize certain points that may be ætiological factors in the production of a given post-operative complication:

1. Was the operation performed for an acute or chronic abdominal condition? If acute, was there free pus present, and was there a rubber drainage tube or tubes used? I have seen a great deal of distention, and even vomiting result from leaving a rubber drainage tube too long within the abdomen pressing on a loop of small bowel. If chronic, then we must expect more or less abdominal trouble which is, however, unlikely to become dangerous.

2. Length of time taken at the operation. There is no doubt that, other things being equal, the shorter the operation the less likely we are to have trouble developing later.

3. Amount of anæsthetic? A long time taken to put the patient under, together with much anæsthetic, and air swallowing during the first stage, tends to produce stomach complications.

4. What was the operation done, and what difficulties arose?

5. How much traumatism was caused to the bowels and mesentery by clamps, manipulation, or pulling on the intestines through too small an abdominal opening? There is no doubt that by carefully handling the intestines, loosely applying

clamps, and making a good sized opening, we can avoid much post-operative trouble.

6. Was there needless exposure of the intestines to chill or to iodine irritation?

Summing up then, was the technique all that could be desired?

In order to make a correct diagnosis of the post-operative condition, we must take into consideration some fundamental principles. The alimentary tract may be roughly divided into a secretory part, the mouth, stomach, and duodenum, into which is secreted about two pints of saliva and a similar amount from the other glands, and a lower portion, the colon, in which most of the water is abstracted from the intestinal contents. One can readily see then that a large quantity of fluid may be vomited without a marked dehydration of the patient taking place. Vomiting occurs earlier the higher the lesion is situated in the intestinal tract. Furthermore, speaking generally, sensations of pain can only be localized in those segments of the alimentory canal, which are more or less fixed, viz: stomach, duodenum, and colon, and the higher the lesion the greater the pain. The visceral peritoneum is more sensitive than the parietal, and even this sensitiveness differs in different people, and is greatly exaggerated in the neurotic. Certain people, as if the victims of an idiosyncrasy, form adhesions following an ordinary uncomplicated laparotomy; and, as the result of a slight infection of the peritoneum, one patient will develop septic peritonitis while another will straightway clear up. Finally, all abdominal operations produce more or less violent stimulation of the sympathetics, which in turn causes profound vascular disturbances within the abdomen.

Almost every abdominal operation is followed by some shock, some vomiting, more or less abdominal pain, and distention, a complex called by some writers, "Peritonism". I have seen vomiting continuing for two or three days called by the physician in attendance "anæsthetic vomiting", with little or no attempt to prove or disprove the assumption, or to alleviate the condition in any way.

These troublesome cases of vomiting and gas distention are too often relegated to the interns and nurse, and it is only when the symptoms of peritonism become more aggravated that the surgeon's attention is called to the fact and he then takes a renewed interest in the case. The patient, while not looking particularly ill, is nevertheless very uncomfortable, is vomiting more or less, is distended, and complains of colicky pains within the abdomen. High turpentine enemas, pituitrin, eserine, and strychnine, will usually relieve the patient and possibly save further complications. But should this treatment prove of no avail, the patient begins to look ill, is worried, and wonders why this vomiting is continuing. Although he has marked pain in the epigastrium, respiratory embarrassment and an feeling of distention, the vomiting has assumed the predominant feature of his post-operative condition. The vomitus seems to well up without effort, and is at first yellowish in colour, becoming dark brown or black from admixture of secretions with bile and blood. It fairly burns the mouth and lips of the patient and huge amounts are brought up. Removing then the tight abdominal binder or broad adhesive (which has added much to the discomfort of the patient), one sees a swelling over the stomach region which conforms to the capacity of the stomach, and one recognizes immediately an acutely dilated stomach, which should have been diagnosed a day or so sooner. This condition arises as a sequela to operation performed for gastroptosis and enteroptosis in the anæmic, neurotic women, who for long periods have taken cathartics, thereby producing atony of the stomach musculature. I have seen it following other abdominal operations, notably hysterectomies and the larger ovarian tumours.

The cause of this acute dilatation of the stomach which is a primary condition, seems somewhat obscure; but knowing the class of patient as those with atonic, or slowly emptying stomachs, highly neurotic and impressionable women, who may be ærophagics, we should be continually on our guard for this distressing post-operative condition.

Treatment. Reassure the patient beforehand, for fear of the operation has much to do with disturbing the rhythmic contraction of the stomach. If castor oil is given, it should be administered at least two days before the operation; an enema on the morning of the operation is sufficient. Avoid morphia as much as possible.

The actual treatment consists in:

(a) Early and repeated gastric lavage.

(b) The prone position.

(c) Normal saline by the bowels or subcutaneously.

Another set of circumstances. Having arrived at the third or fourth day following operation,

and the signs of peritonism increasing, we find the patient anxious, the pulse increasing in rapidity and losing volume. Temperature may be normal, but the vomiting has increased, and, as it were, "slops over". Pain is marked above or around the umbilicus, especially if localized peritonitis exists. But in this case we do not find the characteristic swelling of the acutely dilated stomach. There is almost complete constipation and inability to pass gas, notwithstanding the nurse's report that some small amount of fæces and gas were passed, we must come to the conclusion that we are dealing with paralytic ileus. The diagnosis of this condition from mechanical ileus is often difficult, for those conditions which cause the former may also cause the latter. However, in mechanical ileus, the toxæmia is not so marked and is slower in onset. The abdominal pain is at first colicky, becoming localized as peritonitis supervenes. Excepting in the very thin, one must not expect to see the ladder-like arrangement of the coils of small intestine as seen in chronic obstruction of the bowels.

This condition is a desperate one and we must recognize it early; by this, I mean, before the patient has taken on the markedly toxæmic look when all treatment fails. In passing I refer you to the work of Whipple, Stone and Bernheim, and of Draper, who have made such exhaustive studies upon toxic agents present in the duodenum which are, together with the great dehydration of the patient, responsible for his death.

There is a time when it is essential to make the diagnosis between these two conditions, for the one may reasonably be treated for some hours medically, while the other must be treated surgically. If it is paralytic ileus, and the general condition of the patient is fair, collapse not too marked, pulse not over 80 or 90, and the distention not so severe as to lead one to suppose that the bowels are beyond stimulation, then one is justified in continuing gastric lavage, high enemas, pituitrin, eserine and strychnine. If mechanical, then one must reopen the abdomen and relieve the obstruction, be it adhesions, bands, or the like, not forgetting that there is a certain amount of toxæmia from the upper bowels that must be elinimated. This stage having passed, then the immediate treatment is the same in both, namely, enterostomy. This is performed under local anæsthetic, the jejunum is opened as high as possible, leaving the mechanical obstruction for a later date. It is useless to do more, the bowel wall has already lost its power of keeping back bacteria and the peritoneal cavity is infected; any further manipulation takes away what little chance the patient may have.

Here I wish to refer to a condition of paralytic ileus, differing little from the foregoing but usually showing more distention in the flanks, and in which the colon as well as the ileum is involved. This condition has been ably described by Handley, and is called by him "ileus duplex". Since the publication of his paper, I have taken pains to note the position of the small bowel, that he describes as hanging over the brim of the pelvis, and I have called my assistant's attention to this loop on several occasions. This condition may develop following infection of the pelvis, due to an acute ruptured appendix or pus tube and ovary.

These forms of ileus may give some difficulty in diagnosis from general septic peritonitis, but the careful perusal of the history of the case, the searching study of the face, and behaviour of the patient, together with the trained hand upon the abdomen, and a polynuclear blood count, should keep you right. To the trained diagnostician there is a subtle difference (fineness of distinction) in the look of the face and in the constitutional symptoms of a patient who is dying from a toxæmia or chemical poison produced within the duodenum or bowel, from that produced by septic infection in the general peritoneal cavity or without the bowel. The marked tympanites and abundant exudate seen in septic peritonitis limits the inflammatory process and lessons absorption. In brief, the treatment of septic peritonitis is absolute rest for the bowels and for your patient generally, by giving morphia, gastric lavage, rectal tube, inserted at intervals, hot turpentine stupes to the abdomen; and sustain your patient by judicious stimulation and normal saline by the bowels. Salines, no matter how given, produce better results in general peritonitis than in acute dilatation of the stomach or paralytic ileus.

Finally, there are those cases in which possibly the peritonism, following gall bladder operations or duodenal ulcers, has not been so marked as in the preceding, but the patient is seized with intense pain around the umbilicus or just above it, vomiting becomes worse, and intense collapse supervenes, with marked signs of intestinal obstruction. We diagnose acute pancreatitis or thrombosis of the mesenteric vessels. The condition is so grave that, having waited for the

initial shock to pass off, an exploratory laparotomy is justified, and reveals, in the former, a bloody fluid within the abdomen, fat necrosis, an enlarged pancreas with necrotic areas, and in the latter an extent of dark, lifeless bowel. Finding acute pancreatitis, drain the gland freely by means of cigarette drains passed through the gastro-colic omentum; if thrombosis, the case is hopeless and nothing remains but to close the abdomen.

In conclusion, I ask each operator to consider it a serious matter to open an abdomen. Having done so, the case demands the very best post-operative treatment by the attending surgeon, for it is often the unexpected that happens. We can lessen the high mortality in these conditions only by the early recognition that our patient is not doing well and that something is going wrong within the abdomen, not by leaving the patient until marked distention and pain make the diagnosis of these complications well nigh impossible.

THE TREATMENT OF DIFFUSE SUPPURATIVE PERITONITIS

J. S. McEachern, M.D.,
Calgary, Alberta

THE problem presented by the treatment of diffuse suppurative peritonitis—that condition in which we find free pus in the peritoneal cavity—is one which never loses its interest. Unfortunately it is one of those conditions which, from one cause or another, is for ever forcing itself upon our attention. Notwithstanding the fact that much has been accomplished in the last quarter of a century in the way of improving our methods of dealing with this condition, it is a regrettable fact that every year great numbers of people succumb to its ravages.

It is safe to say that for many years to come the aggregate number of deaths from this condition will continue to constitute a considerable percentage of the annual number of deaths from all causes throughout Canada. It is, I trust, not too much to hope, that with increased enlightenment of the population, lay and medical, with regard to acute abdominal conditions, the present mortality will become greatly reduced. Modern medicine and surgery in every department accord a high place to preventative measures. No study of diffuse suppurative peritonitis can be complete without a consideration of preventative as well as curative measures. The subject of peritonitis is so broad, and the causes so various, moreover the stage of the process reached in individual patients when they appear for treatment, differs so widely that it is manifestly impossible to discuss in the course of a short paper all problems which arise. It will be admitted by everyone that the first logical requirement in the treatment is the removal of the cause. The question may arise on first seeing a case as to whether the attempt to do this should be immediately carried out or whether operation should be delayed for a time to permit nature to localize the infection. Undoubtedly most cases require immediate interference.

There are, however, other cases seen during the period when the individual is suffering from the initial shock produced by the sudden infection, when the wisest course is to postpone operation for a short time.

The judicious selection of these cases is so much a matter of judgment on the part of the surgeon, that it would seem that a purely academic discussion of the points on which a decision is based, would be a waste of time here. At the outset it must be recognized that time is a most important element in deciding the prognosis, that is to say—cases seen early and operated on early, often give most brilliant results in the hands of different men using very diverse methods of post-operative treatment. It is equally true that cases encountered late, when the suppuration is widespread and the toxines have produced marked vaso-motor disturbance, do very badly under any form of treatment.

There are, however, certain fundamental principles which apply with equal force to all these cases no matter in what stage of development they are met.

The anatomical arrangement of the peritoneum

is of such a nature that, partially enveloping as it does, muscular hollow structures, a given area of it is liable to be pushed about from place to place by the muscular activity of the hollow viscus which it covers. This of itself complicates the problem of giving it rest and, as it were, places it at the mercy of the structure to which it is attached.

Moreover, such an area of peritoneum, subject to suppurative inflammation, becomes a menace to the healthy adjacent or even distant parts of the peritoneal cavity by reason of the vermicular action of the enclosed intestine tending to push it about, and infect all that it touches.

Since the examination of the gastrointestinal tract in chronic affections, by means of the *x*-ray screen, has been so frequently resorted to we have come to realize what comparatively slight stimuli are necessary to set in motion this peristalic activity. Even a small amount of water with an inert opaque substance in suspension, if taken into the stomach while the abdomen is being observed, can be seen to be projected rapidly into the small intestine when it is very rapidly passed along by the contractions of the muscular coats of the bowel.

Bearing in mind constantly the peculiar anatomical relationship of the peritoneum as an investing covering of the intestine, we can better realize the cause of the development of diffuse suppurative peritonitis. Further, we can better understand the cause of the development of the varied manifestations which result when the peritoneum becomes attacked by acute inflammation. In inflammation even of a simple character which never goes on to suppuration, we find exudation of inflammatory products. In the case of the peritoneum, part of this takes place into the peritoneal cavity in the form of free fluid, but just as surely some takes place in the other direction into the connective tissue spaces of the intestinal wall. This even by its mechanical action interferes with the muscular power of the intestinal walls with the result, that that particular portion of intestine no longer by the contraction of its muscular coats forces its contents downward. Although in effect this amounts to a partial obstruction, it is nature's method of putting the part at rest. This rest, if not interfered with by meddling, permits coils of intestine and omentum to become adherent one to another so as to close off the inflamed area from the undamaged peritoneum.

Furthermore this paresis may result in a backward flow of the bowel contents into the stomach from which it is expelled by vomiting. This phenomenon should be a clear and unmistakable announcement from nature that the intestinal tract is closed for repairs and that no new business is to be received until repairs are completed.

How often, however, is this sign misinterpreted or ignored and an effort made to force the contents of the intestine downward by purgatives. The net result of this interference is, that nature's efforts to place the inflamed peritoneum at rest is overcome and the inflamed surfaces are pushed away from each other so that the formation of a barrier of adhesions cannot be accomplished.

Let us briefly review the train of events which lead up to the development of a diffuse suppurative peritonitis resulting from one of the most common causes,—the rupture of an acutely inflamed appendix. If the adjacent intestines are not in a state of active peristalsis the process just referred to will take place and the infected contents which have just leaked into the peritoneal cavity will cause a protecting inflammation of the peritoneal covering of the intestine with which it comes in contact, resulting in the adhesion of intestinal coils one to another. At the same time their muscular walls are held in a condition of comparative inactivity by the mechanical action of the exudation and perhaps its chemical action on nerve endings. If, on the other hand, the intestines were at the time of rupture in a state of peristalic activity the infective material would be carried widely through the abdomen. The widespread inflammation thus induced produces free liquid pus in the cavity. Here and there where the intestine is quiet are formed areas of plastic lymph when nature is endeavouring to cause the intestines to adhere and wall off the spreading tide of pus.

The absorption of toxic products from the peritoneum and from the stagnant material within the intestine brings about a vaso-motor paresis resulting in the cyanosis of the extremities. The dilation of the peripheral vessels together with diminution of the fluids in the blood vessels gives the heart less to contract upon. To cope with this, the heart acts more rapidly, as evidenced by the small rapid pulse. All this time the patient is further depressed and shocked by the inevitable associated pain. This constitutes a rough outline of the pathological processes developing in a spreading purulent infection of the peritoneum.

In the active treatment of a diffuse suppurative peritonitis it follows then that we have to cope

with a number of conditions all arising primarily from some focus whether it be a necrotic appendix, a ruptured hollow viscus or what not. These are: The intestinal paresis and resulting distension; the presence of free pus in the abdomen; the general toxæmia and the circulatory disturbance associated with it, and always to a varying degree, pain. It is, we may assume, universally admitted that the first essential in treatment is the removal or segregation of the primary focus whether that necessitates the removal of a diseased appendix, ruptured gall bladder or the closure of a perforation in a hollow viscus. The technique of these procedures has been so thoroughly discussed in various works on abdominal surgery that we need not to-day do more than refer briefly to a few important considerations. The operative work, whatever is required, should be carried out with all possible rapidity but at the same time with the utmost gentleness, so as not to inflict further trauma on already inflamed structures. Much of the free pus can be removed while the actual work of removal or repair of the causative factor is in progress. This is most easily accomplished by use of the suction pump, without inflicting the injury which sponging causes.

Tube drainage should be inserted, one tube of large calibre down to the floor of the pelvis and another to the site of the primary cause, and these brought to the surface through either the operation wound or other stab wounds. The wound is then closed. If the tubes have egress through it, care should be taken not to close the wound too tightly around the tubes. A suitable absorbent dressing should then be applied. It is the writer's conviction that in a very large proportion of these cases of diffuse suppuration in the peritoneum that the battle has only begun when the operation has been finished and that the fate of the patient is determined quite as much by the form of post-operative treatment to which he is subjected as by the skill with which the operation is performed.

Certain fundamental principles have been laid down for the treatment of peritoneal inflammation, notably by Fowler, Ochsner, Murphy and Crile, and while in a general way these principles are accepted by the majority of surgeons, it would seem that they are not always carried out to their logical conclusion.

In the pre-operative care of a case of localized peritonitis accompanying an acute appendicitis, for instance, no surgeon of the present day would dream of using active measures to overcome the distension of the coils of intestine which, adhering together wall off the infection from spreading through the peritoneum. He recognizes that absolute rest is essential.

The paresis of these limited lengths of small intestine, produced largely by inflammatory exudation into their walls, is nature's method of overcoming the activity of these portions of the gut and so preventing them from spreading the infective material on their peritoneal surfaces to distant parts of the abdominal cavity. In the paresis and resulting distension of greater lengths of small intestine in the diffuse type, is not nature still endeavouring to place the peritoneum at rest? In the diffuse type of suppurative inflammation of the peritoneum when the operation is successfully completed we are still confronted with the problem of aiding nature to overcome inflammation, and localize the pus which, despite our greatest care and effort, we cannot wholly remove. How then are we to accomplish this? The first essential is to put the inflamed part at rest. Obviously, so long as any factor which causes peristalsis comes into play this cannot be done.

We have learned, as has previously been referred to, that the presence of any material in the stomach tends to produce peristalsis. Clearly then the first indication is, to empty the stomach by lavage with warm water before the patient leaves the table.

Following that, it is equally essential that nothing, not even a drop of water, be allowed to get into the stomach until sufficient time has elapsed for firm adhesions to form around collections of pus which may remain in the abdomen and safely encapsulate them.

An additional measure at our disposal to control peristalsis, which has been emphasized by Waugh, of London, and Crile, of Cleveland, is the administration of morphine. This should be given, not in trepidation, but freely enough to keep pain constantly under control. In this connection it is held by some that morphine is objectionable, inasmuch as it favours further paresis of the muscular coats of the intestine and so produces greater distension. This objection is not upheld by the experiences of those who have used morphine freely in this condition. Experience has shown that if the intestine is kept at rest by the measures indicated the inflammation subsides, thickening in the intestinal wall is absorbed and the normal functions of the muscular coats of the intestine is resumed.

Then in spite of the supposedly paralyzing effect

of the opium the patient expels flatus spontaneously, without any additional stimulant to peristalsis. The administration of opium exerts a two-fold beneficial effect. It tends to lessen peristalsis, aiding in keeping the part at rest, and, as Crile points out, by preventing painful impulses from the peritoneum reaching the central nervous system, minimizes shock. While the advocates of the free use of morphine may not be prepared to go so far as Crile and give sufficient doses, repeated frequently enough to keep the respirations down to twelve or fourteen to the minute, many surgeons are agreed on its great value given in doses sufficient to keep pain constantly overcome. One has to recognize that there are a certain number of patients who appear to have an idiocyncrasy for morphine. When it causes respiratory difficulty or markedly increases cyanosis it must be discontinued.

If the intestine is to be kept at rest by permitting absolutely nothing to be put into the stomach, the problem of supplying food and water has to be solved.

So far as food is concerned, this may be disregarded. In the average case even if the individual be poorly nourished, the cutting off of the food supply for a number of days does not cause serious disturbance, provided that abundance of water can be introduced into the system. It is absolutely necessary, however, to provide water, for three reasons. Firstly, to wash out the toxines; secondly, to fill the blood vessels and so give the heart something to contract against, otherwise the increasedly rapid contractions of the heart, to keep the diminished contents of the vessels in circulation will wear it out; and, thirdly, to assuage the intolerable thirst.

The introduction of water in sufficient quantities can usually be accomplished by the instillation of plain water, salt solution, or soda solution, into the rectum. It may be desirable to add to the soda solution glucose in sufficient quantity to make a 5 per cent. solution. This it is claimed lessens the tendency to the acid intoxication which tends to develop in cases which are subjected to starvation and supplies a small amount of carbohydrate nourishment. Mead's maltodextrose may be used in preference to glucose, as it is apparently non-irritating. Some samples of glucose have been found to be intensely irritating. Occasionally water or saline solution given by the drop method will be found to be badly tolerated. In some cases the substitution of slow injections of 10 to 15 ounces of water or soda solution every four hours is better borne. In cases where neither can be tolerated, saline solution can be introduced subcutaneously. In some cases the intolerance of the rectum to the instillation of water drop by drop is undoubtedly due to the accumulation in the rectum of fæcal matter.

The gentle irrigation of the rectum with normal saline solution by means of a large rectal tube and funnel once or twice a day will frequently overcome the difficulty. This ought not to be administered as an enema because it may have the effect of producing rather active peristalsis. It should rather consist in permitting a very small amount of fluid to run into the bowel and then immediately draining it away through the tube. This process is to be repeated until the solution returns free from fæcal masses. The administration of so-called *nutrient enemata* in these cases is of very doubtful utility, as it is apt to leave in the bowel a putrescent residue of unabsorbed material. This causes irritation of the rectal mucous membrane and renders difficult the administration of the necessary amount of water. In an acute condition, such as that we are dealing with, the patient's fate is decided, as a rule, in a few days. When so much depends on the absorption of sufficient water, it seems hardly worth while to take any chances with a measure of such doubtful utility as the nutrient enema.

Posture in this, as in inflammatory conditions elsewhere, is worthy of great consideration. The placing of the patient in a sitting position according to the method of Fowler, favours the gravitation of pus into the pelvis, where absorption is less active, and from which exit has been provided by the drainage tube. The patient, moreover, is usually more comfortable and respiration is easier. The modern Fowler bed makes the maintenance of the partially sitting position fairly easy. This, however, ought not to satisfy the attending surgeon. Not infrequently one finds that the patient is allowed to sag down so that, the buttocks resting on one incline and the shoulders on the other, the patient's spine presents a curve with convexity downward. Obviously the patient is worse off in this position than he would be if placed on an ordinary mattress. This is mentioned only as a detail, which requires constant supervision.

Admitting the correctness of the theory of establishing physiological rest by the treatment outlined, the question arises, how long should it be kept up? In a general way it should be persisted in until there is evidence that the acute inflammation has subsided, and that any purulent

collections which have failed to drain away are, firmly encapsulated. This is shown by the improvement in the patient's general condition lowering of pulse rate, cleaning of the tongue, lessening of the distension, disappearance of pain and spontaneous expulsion of flatus. How many days it will require in a given case to reach this degree of improvement, will naturally depend on many different factors. The virulence of the infection, the extent of the diffusion of the pus and the patient's reparative powers, will all have some influence in determining how many days' rest will have to be enforced. In some cases with good vitality, and a moderate diffusion of the pus, a few days will suffice. In other cases, where the infection is more wide-spread and reparative activity is slow, as much as six or seven days may be needed. In any event the use of stimulants of intestinal peristalsis, whether in the form of purgatives, irritating enemata, or hypodermic injections, has no place in the treatment of acute suppurative peritonitis either before or after operation. The distressing distention of the abdomen which is so often present in these cases on the second or third day after operation seems to be a temptation to use measures to stimulate peristalsis, and so cause the distending gases to be expelled. If this temptation is yielded to, and movement of the bowels produced, it is apt to be at the cost of bringing about a wider diffusion of the infective material, and injury rather than benefit results to the patient. The safest treatment of distension lies in preventing anything from being put into the stomach and the occasional insertion of the rectal tube each day. To summarize the treatment in brief, it consists of: 1. Early removal of the cause by operation. 2. Provision for the escape of pus by suitably placed drainage tubes. 3. Posture to favour the gravitation of pus into the pelvis, *keeping the intestines at rest as far as can possibly be done* by means of interdicting all food and water by mouth and the free use of morphine to lessen peristalsis and control pain. 4. Lessening of shock by cutting off painful stimuli by means of morphine. 5. Introduction of water into the system by rectum to flush kidneys and carry away toxines. 6. Avoidance of purgation at every stage of the disease. While it is essential to prevent even water reaching the stomach, it is premissable and desirable that the patient should be at liberty to rinse the mouth as frequently as desired. For this purpose water, either plain or flavoured with fruit juices can be used. Permitting the patient to chew gum helps to keep the saliva flowing and renders them more comfortable.

In so recently published a reference work as the "Oxford Loose Leaf Surgery," on page 847, under the heading of "Treatment of Diffuse Suppurative Peritonitis, After Treatment." *Feeding:* Should vomiting persist feeding by the mouth is useless; in any case nothing but sips of warm water only are to be allowed during the first twelve hours. Later it is best to commence with albumen water, whey, or milk and soda water. To these may be added some of the various patent foods and meat extracts after the first twenty-four hours. Thirst in the early stages is best met by infusion of normal saline per rectum."

It may seem presumptuous to criticize the teaching of so distinguished an authority as the author of the above. The writer of this paper contends that such treatment will often be sufficient to turn the scale unfavourably. Whether the case be apparently mild or apparently hopeless it would seem that it is advisable to secure physiological rest for at the very least forty-eight hours, and this cannot be accomplished if sips of water or broth and other liquid food be given. I am aware that the points which have been brought forward for your consideration in this paper may seem to many of you to be trite. It may be said, and truthfully said, that nothing new has been presented. Can you not recall a circumstance somewhat like this? One is asked to see a case of diffuse peritonitis, which was operated on perhaps three days ago. The attending practitioner informs one that drainage was going on well and the patient was in very fair condition. There was, however, a good deal of distension. He decided that the bowels ought to be moved, and for that purpose had given calomel, magnesium sulphate, perhaps hypodermics of eserine or pitrutrin, and was much gratified when at last a good evacuation of the bowels was secured accompanied by free expulsion of flatus.

The patient, however, had seemed to go to pieces soon after; the pulse became rapid and thready and he manifested symptoms of profound shock. The doctor had lost sight of the basic principle in the treatment of inflammation, the maintenance of physiological rest. By his treatment he had moved about inflamed peritoneal surfaces and torn down the adhesions which nature was building. This is my apology, if any be needed, for presenting this paper.

Some reference was made at the beginning of

the paper to preventative treatment. In looking back over our cases of diffuse peritonitis secondary to acute appendicitis, most of us will agree that by far the largest number of these had been given a purgative. It may have been taken by the patient himself or administered by kind and well-meaning friends. The average lay citizen has an abiding faith in the efficacy of a purgative as a cure for belly ache. Pick up any newspaper or periodical, whether it be the weekly paper of the country village or one of the daily papers of a large city, you will find in it advertisements of purgative nostrums which claim to cure cramps, colic, and disturbances of the digestive organs. A few of them even specify appendicitis and gall stones as coming especially within their field. How often have you seen an article calling the attention of the people to the danger of taking a purgative in the hope of relieving an acute abdominal pain? What measures have ever been taken to educate the laity in regard to the great danger to life that lies in the administration of purgatives in the presence of acute appendicitis? Can we wonder then that they resort so readily to the only means which seems to be at hand, especially when such measures are forced upon their attention daily? How then is this to be combatted? In all matters pertaining to health and prevention of disease the great mass of the intelligent public look to the medical profession for guidance. It is our duty individually and collectively to aid them in these matters.

Surely the time has arrived when the medical professon of Canada can take steps to carry on a propaganda of education through the lay press, not only in regard to this point, but many others of equal importance. No one would claim that educating the public to avoid purgatives as a treatment for acute abdominal pain will prevent the occurrence of diffuse suppurative peritonitis. Most surgeons will agree, however, that if this could be accomplished, many cases of this distressing condition which go to a fatal termination, would never have developed. They would, on the other hand, have presented themselves for surgical treatment at a time when comparatively simple measures would have sufficed to produce a cure.

It has been decided at a meeting of friends and former colleagues of the late Colonel Sir Victor Horsely, to take steps to commemorate his services to Science and the Empire, by the foundation of a Lectureship or Scholarship bearing his name.

Sir Victor Horsely was one of the most noteworthy students of University College Hospital, a very distinguished medallist and graduate of the University of London, and a leader and first Chairman of the Representative Meeting of the British Medical Association. He was a Fellow of the Royal Society, and a pioneer in research work connected with the causation of myxœdema. His investigations on the value of the Pasteur method of treating rabies, were of the utmost value as proving the possibility of stamping out rabies in Great Britian.

Over and above his great achievements in Science and in Surgery, he will ever be remembered for his unselfish enthusiasm for the social betterment of his fellows, and he leaves us the memory of a unique character whose brilliance shed its lustre on his profession and his life-work.

DIVERTICULITIS OF THE LARGE BOWEL

J. C. Masson, M.D.

Section on Surgery, Mayo Clinic, Rochester, Minn.

DIVERTICULA of the large bowel, congenital or acquired, are undoubtedly much more common than the average clinician, surgeon, or pathologist realizes. All congenital pouches are true diverticula, their walls being composed of the structures of the bowel wall at their point of origin. Acquired diverticula may be either true or false. The false diverticulum has no muscular coat, or at least a very imperfect one; it is this type in which we are most interested.

False diverticula vary in shape from straight tubular canals to flask-shaped pouches with narrow necks, connected with the lumen of the bowel, and are from about 0.5 cm. to about 3 cm. in diameter. They are frequently spoken of as mucosal hernias, since they are the result of a protrusion of the mucous membrane through openings in the muscular wall. They are covered by serosa with a varying amount of submucosa intervening. On account of their narrow necks and the fact that they occur in a part of the bowel in which the contents are semi-solid, they are usually distended with fecal matter which becomes inspissated and acts as a mechanical irritant to the mucous membrane. Ulceration results and the infection extending through the mucous membrane causes a variety of sequelæ.

The clinical diagnosis and the surgical treatment of diverticula of the large bowel have been among the marked advances in medical science during the last fifteen years. True to professional traditions, however, they have hardly reached the important place in medical literature that they deserve; in fact, few text books give an intelligent description of the various phases of intestinal diverticula.

Virchow, in 1853, in describing "isolated circumscribed adhesive peritonitis of the colon", no doubt referred to diverticulitis of the large bowel, and Fisher's case of an inflammatory communication between the sigmoid and bladder, reported in 1858, probably was diverticulitis. It was not until 1898, however, when Graser demonstrated the presence of diverticula in conjunction with the inflammatory process that the entity of the disease was established. Following this several observers noted and described the condition. The first complete article in the English language was published by Beer in 1904. In 1907, Mayo, Wilson, and Giffin reported in detail with pathologic findings five cases in which the colon was resected, and referred to several others in which there is little doubt that diverticulitis existed. In three of these operation was performed for vesicosigmoidal fistula of inflammatory origin, and several other cases with the same ætiology had no doubt been treated at the Clinic for left-sided abdominal abscesses or fistulæ.

Since the publication of this paper many short papers on the subject with reports of one or two cases and a review of the literature have appeared. Excellent articles on different phases of the subject have been published in recent years by Moynihan, Bruce, McGrath, Mayo, Carman, Giffin, Telling, Erdmann, and others.

Certain phases of diverticulitis of the large bowel are often confused with malignancy, and there is little doubt that some of the so-called cures that are claimed even at the present time for extensive cancer of the large bowel are cures following operations for diverticulitis, and if careful microscopic examinations were made of all such specimens the frequency of the occurrence of the condition would be more thoroughly realized.

The similarity of cancer and diverticulitis of the large bowel is suggested by the title of Moynihan's first paper on the subject, published in 1907, "The mimicry of malignant disease in the large intestine." The macroscopic appearance of proliferative extramucosal inflammatory masses and carcinoma are very similar in many cases; a microscopic examination of the tissue is often necessary in order to make a correct diagnosis.

Telling, in 1908, collected one hundred and five cases from the literature; in twenty-seven operation had been done, and in eleven the condition was thought to be malignant at the time of operation.

Presented before the Ontario Medical Association, Toronto, May, 1920.

The other diverticula were found at necropsy or on re-examination of museum specimens originally considered malignant.

From January 1st, 1904, to May 1st, 1920, two hundred and fifteen cases in the Mayo Clinic were diagnosed diverticulitis. In one hundred and thirty-six cases the diagnosis was made clinically from symptoms and rœntgen-ray findings. In ten of these carcinoma was also diagnosed. Twenty-seven of the remaining ninety-nine cases were diagnosed carcinoma, and in fourteen of these both conditions were found. In most of the other cases operation was done for some other condition and the diverticula were found accidentally. Beside the cases considered in this paper, seventy-three appendices were removed which were found to have diverticula in their walls.

Diverticula of the acquired type may be found throughout the entire length of the large bowel. The condition occurred in the sigmoid in ninety-three of the one hundred and twelve patients operated on, in the rectum in seven, in the cæcum in six, in the descending colon in four, and in the transverse colon in two. In some of the cases in which the diverticulum was listed as being in the sigmoid a few diverticula were also present in the descending colon. In a few instances they were distributed along several feet of the colon.

As a rule diverticula of the large bowel are multiple; occasionally they are associated with diverticula in other viscera. In a case reported by Hansmann, there were more than four hundred in the intestinal tract. In the cases most frequently noted by surgeons the disease is limited to a comparatively small part of the large bowel, particularly the sigmoid and descending colon, which usually have from five to ten discrete diverticula.

Constipation is marked in most cases of diverticulitis. Men are affected almost twice as often as women. In spite of the fact that Erdmann and others have reported cases in childhood, the disease belongs essentially to middle life and old age. In children the diverticula are probably congenital and apt to be associated with other congenital anomalies. None of the patients operated on were in the first or second decades, only five were in the third, thirteen were in the fourth, thirty in the fifth, thirty-nine in the sixth, and twenty-five in the seventh and eighth.

Ætiology. No single factor furnishes a sufficient explanation of the origin of all acquired diverticula. Weakening of the wall of the bowel and increased pressure from any cause, from within ts lumen, especially in the distal half of the colon where fecal matter is stored for intermittent elimination and is more solid than that in the upper bowel, are probably the most constant clinical findings. This is especially true if the predisposing causes are of long standing. The term "mucosal hernias" indicates that the same mechanical and nutritional factors that predispose to hernia in other parts of the body are to be considered. It is a striking fact that most of the patients appear healthy, and very few give a history of losing weight, and except when there is a superimposed malignancy there is no evidence of cachexia. In our cases the average weight was one hundred and fifty-six pounds; the heaviest patient weighed two hundred and twenty-seven pounds, the lightest one hundred and twelve pounds. In a few cases there was a definite history of obesity with some loss of weight during the last few months. The normal structure of the large bowel with its irregular arrangement of longitudinal muscular bands and multiple sacculations, together with the presence of a considerable amount of subserous fat accompanying relatively large perforating blood vessels in which the blood pressure varies considerably, must at least be considered a predisposing cause.

Diverticula may possibly be found at any point on the circumference of the large bowel, but the greater number are on the sides between the mesocolic and lateral muscular bands. They gradually increase in size and naturally grow in the way of least resistance toward the mesentery or into the bases of the appendices epiploicæ. Their necks, or points where the mucous membrane pierces the muscular wall, are, in most cases at least, at points where the blood vessels also pierce the muscular coat. Some of the early writers considered the mesenteric attachment the most frequent seat of the disease, but pathologists now are agreed that diverticula seldom, if ever, originate at this point, because the bowel wall is exceptionally strong at the site of the mesenteric attachment. In a diagram of the large bowel (Fig. 1) the weak point is shown well up on the sides of the viscus where the blood vessels penetrate the circular muscle.

The mesocolic band is perforated only by relatively small blood vessels which can be the cause of very little predisposing tendency to the development of a hernia at this point. Drummond compares the relation of the blood vessels to the development of intestinal diverticula with the relation of the spermatic cord to the development of inguinal hernia.

The pathologic anatomy varies greatly, according to the location and amount of inflammatory reaction. Undoubtedly in many cases there is

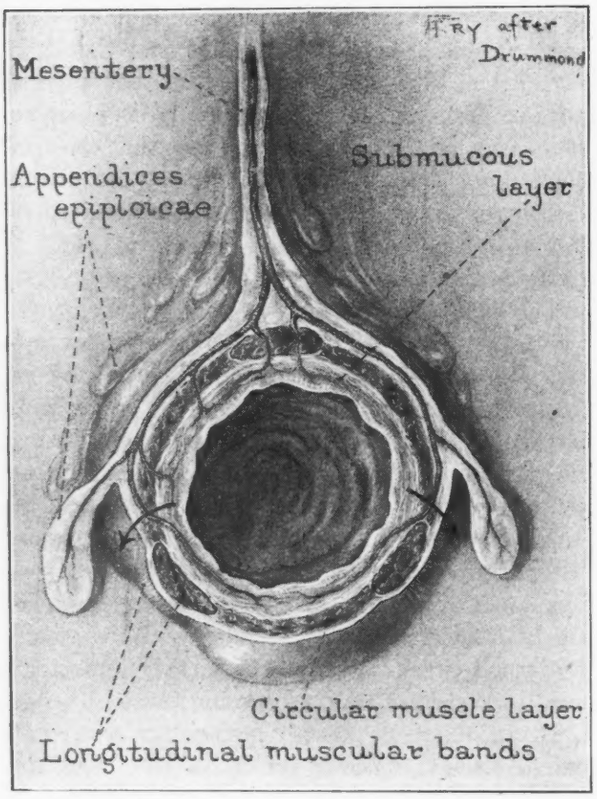


FIG. 1.—Diagrammatic sketch showing distribution of the vessels of the pelvic colon. Arrow indicates probable site of diverticulæ.

little evidence of peridiverticulitis and the diverticula stand out freely from the bowel wall, very often in the interior of the appendices epiploicæ. In other cases there is a chronic mesenteritis as the result of a diverticulum which follows the course of the blood vessels and by extension of infection from the interior to the mesenteric fat results in abscess formation or an inflammatory mass. In still other cases an acute perforation may occur with the typical finding of a general or a localized peritonitis, and in some cases obstruction results from direct pressure of an inflammatory mass on the bowel (Fig. 2). Occasionally, beside the inflammatory changes, carcinomas may also develop in the bowel wall.

The symptomatology of diverticulitis of the large bowel is analogous in many ways to the symptomatology of appendicitis, except that the location is less constant. With both diseases, chronic, subacute, and acute manifestations may develop and the possible sequelæ of abscess formation, fistulæ, localized peritonitis, diffuse peritonitis, obstruction from adhesions or pressure, and malignant changes. Wilson has shown that the symptoms are seldom those of diverticulitis, but more often of a peridiverticulitis.

In many so-called chronic cases one diverticulum causes all the trouble, in other cases one diverticulum after another becomes inflamed, keeping up more or less constant trouble, and the localizing symptoms change according to the position of the inflammatory process. If perforation occurs the symptoms except for location are identical with those with a perforated appendix.

In the differential diagnosis of the acute type of the disease all conditions that tend to produce the so-called acute abdomen have to be considered. In the majority of cases, however, the trouble is in the sigmoid or rectum and the possibility of a left-sided appendix, of luetic and tuberculous conditions, and, in women, of pelvic inflammatory conditions must be ruled out.

The most common type of diverticulitis of the large bowel observed in the Clinic is the chronic, with subacute exacerbations from time to time as a result of extension of infection to the peritoneal surface. During an attack a mass can be felt through the abdominal wall in many cases, and it is the presence or the contraction of a tumor mass that produces the narrowing, and in some cases stricture of the bowel, without any visible change in the mucosa of the lumen of the gut itself.

The clinical diagnosis made in the majority of these cases is carcinoma with infection; a view of the external surface of the growth and palpation frequently tend to confirm this suspicion, and the filling defect shown on rœntgen examination is identical in the two conditions. Not until the

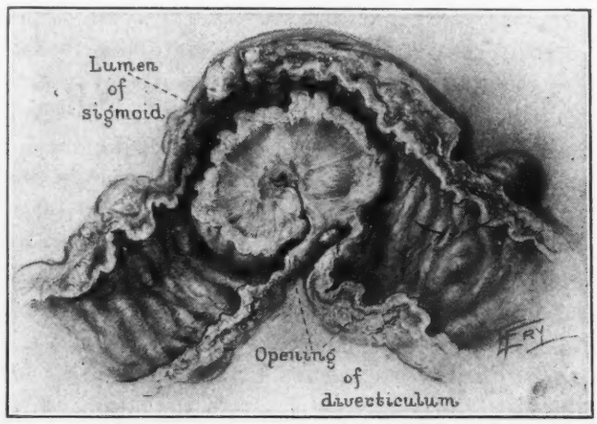


FIG. 2. (Case A84962). Diverticulitis of the sigmoid. Inflammatory mass causing obstruction.

FIG. 3.—Extensive diverticulitis of the large bowel.

bowel is resected and thoroughly examined is the truth known.

Sometimes abscesses develop as the result of diverticulitis. In some cases they are within the leaves of the mesentery and cause obstruction by pressure or angulation of the bowel. In other cases they rupture into the bowel or into some other viscus, especially the bladder. Vesicosigmoidal fistulæ occurred in five of our cases. Since malignancy is the only other condition responsible for such fistulæ a cystoscopic examination as a rule clears the diagnosis.

In a very interesting group of cases of intestinal disease the history of several years is typical for diverticulitis; the loss of weight and strength is rapid during the later months. The hemoglobin is lowered and blood and mucus appear in the stool. Rœntgen examination in many cases shows multiple typical shadows of diverticula and a definite filling defect. Proctoscopic examination by which malignancy in all relatively low-lying growths may be recognized is not of much value in the diagnosis of diverticulitis, since the internal openings are rarely seen in such examinations (Figs. 3, 4, and 5).

A point of diagnostic value is the age of the patient, who is usually more than thirty, more often a man than a woman. His general condition is good as a rule, with little loss in weight. Most patients are very much constipated, although diarrhœa is occasionally met with. The severe abdominal pain comes at irregular intervals. If the peridiverticulitis is marked a mass may be felt during attacks which disappears between attacks. In all cases in which doubt exists a thorough rœntgenologic examination (both plates and screen) should be made; the characteristic round or oval-shaped shadows of barium outside the lumen of the bowel are proof positive of the condition in the majority of cases. Carman has suggested that in order to rule out the possibility that the shadows are phlebolite or calcified bodies, a screen or plate examination should be made before the opaque enema is given. If obstruction exists the consequent filling defect is not distinguishable from that in cases of carcinoma.

We did not fully recognize the value of the rœntgen ray in the diagnosis of diverticulitis until 1914. In that year Carman reported three cases; in the first case he had not been able to account for the small barium shadow outside the lumen of the bowel. From the clinical facts and rœntgen appearance, W. J. Mayo suggested the possibility of diverticulitis. Since that time rœntgen examinations have been of the greatest value in diagnosis.

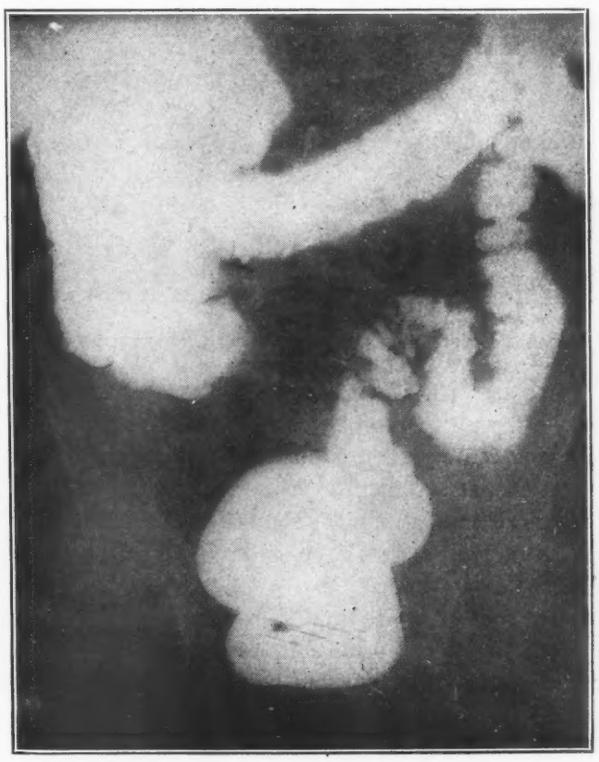


FIG. 4.—Diverticulitis of the descending colon and sigmoid with definite obstruction.

Treatment. The treatment of diverticulitis of the large intestine naturally varies with the phase of the disease and the condition of the patient. In the acute condition the treatment is the same as for acute appendicitis. The diverticulum should be removed if possible and the stump treated like the ordinary stump of the appendix. Care must be taken, however, not simply to invert the stump into the subserous fat which is often over-developed in these cases. Such a procedure would undoubtedly result in the development of an abscess later. The serosa and fat should be well freed from the base of the diverticulum and the latter inverted into the muscular wall. If

FIG. 5.—Diverticulitis of the descending colon and sigmoid.

there are other diverticula it is generally best not to attempt to remove them when removing one that is acutely gangrenous or one that is ruptured, but later to arrange to perform a second operation. If an abscess is found it should be drained, and in case of obstruction a colostomy should be made at the same time.

In the subacute and chronic cases in which there is tumor formation, resection is generally indicated with or without primary colostomy. If the involved part of the bowel can be well freed and delivered outside the abdomen, a Mikulicz type of operation, to be completed in two or three subsequent stages, makes a simple and relatively safe operation and is particularly suited to the case that is a poor surgical rick.

In suitable cases resection of the involved area followed immediately by an end-to-side, end-to-end, or lateral anastomosis is the ideal treatment.

If the rectum is involved (there were several cases in our series) some form of posterior resection is made and, if possible, the sphincter muscle should be saved. It is probable that some of the severe perirectal infections that are followed by stricture and looked on as syphilitic are the result of this disease (Giffin). In some cases very extensive combined anterior and posterior resections are indicated.

A patient with involvement of the distal half of the colon is now under my observation. Ten months ago I explored and found a mass in the pelvis, apparently around the rectosigmoidal juncture. Proctoscopic examination did not show ulceration on the mucous surface and there was no history of blood in the stool; there were numerous diverticula in the sigmoid and descending colon. The mass was believed to be inflammatory and a temporary colostomy was made. About eight months later I received a letter from the patient stating that considerable chocolate-coloured mucus was discharged from the anus several times each day. I advised him to return and on examination found definite evidence of an early malignant condition in the rectum about 7 cm. above the sphincter. April 29th, 1920, I resected the colon from the middle of the transverse colon to the beginning of the rectum, excising the old colostomy and bringing the transverse colon out in the left rectus about 5 cm. below the umbilicus. Operating was rather difficult on account of adhesions that had resulted from the previous operation and it was thought best not to prolong the procedure by performing a posterior resection of the rectum, including the malignant growth. I had hoped to perform the second stage of the operation in ten or twelve days, but an unfortunate wound infection made it advisable to postpone this for the present. June 4th, 1920, a posterior resection of the rectum was performed under combined local and general anæsthesia. Firm inflammatory adhesions to the prostate were found but no evidence of the extension of the malignancy outside the bowel. The patient recovered normally from the operation and twenty days afterwards is about to be dismissed from the Clinic.

Non-surgical measures are frequently indicated, especially in the aged and in patients whose con-

dition is discovered accidentally. The bowel movements should be kept fluid or at least soft, thus preventing distention of the pockets with fecal matter and the formation of fecaliths which predispose to infection and ulceration.

Summary

Diverticula of the bowel are of two kinds: True diverticula in which all structures of the bowel wall are represented, and false or acquired diverticula, in which the muscular wall is lacking, at least in part. False diverticula or mucosal hernias are found more commonly in the large bowel than is generally realized. In some cases they give rise to few or no symptoms; in other cases they produce alarming and often fatal sequelæ. The condition is frequently confused with malignancy, even at the present time.

Two hundred and fifteen patients with diverticulitis of the large bowel have been treated at the Mayo Clinic since 1904; one hundred and twelve were operated on; one hundred and three were not operated on. Diverticula were also found in the wall of the appendix in seventy-three patients operated on for appendicitis. Few of the patients were less than thirty years of age. There were twice as many men as women. Their general condition was good unless obstruction had occurred. The symptomatology and sequelæ were very similar to those of appendicitis. In fourteen cases carcinoma was secondary to diverticulitis. The sigmoid was involved more frequently than any other part of the bowel.

Rœntgen ray diagnosis of intestinal diverticulitis is practically proof positive of the disease. Before the introduction of the roentgen ray, in 1914, as an aid to diagnosis, relatively few cases were recognized before operation or necropsy. Many patients with numerous pouches live until old age and have little or no inconvenience by keeping the stool fluid. The surgical treatment varies from simple amputation of a single saccule to very extensive resection of the bowel.

Bibliography

1. Beer.—Some pathological and clinical aspects of acquired diverticula of the intestine. *Am. Jour. Med. Sc.*, 1904, cxxviii, 135-145.

2. Bruce, H. A.—Acute diverticulitis. *Ann. Surg.*, 1911, liii, 683-686.

3. Carman, R. D.—Report of a case of diverticulitis of the sigmoid, with the rœntgenologic findings. *Am. Jour. Roentgenol.*, 1915, ii, 652-653.

4. Carman, R. D.—The rœntgenologic findings in three cases of diverticulitis of the large bowel. *Ann. Surg*, 1915, lxi, 343.

5. Drummond, H.—Sacculi of the large intestine, with special reference to their relations to the blood vessels of the bowel wall. *Brit. Jour. Surg.*, 1917, iv, 407-413.

6. Erdmann, J. F.—Acute diverticulitis of the colon· Its considerations. *Surg., Gynec. and Obst.*, 1918, xxvi, 207-211.

7. Fischer.—Quoted by Beer.

8. Giffin, H. Z.—The diagnosis of diverticulitis of the large bowel: A clinical review of twenty-seven cases. *Jour. Am. Med. Assn.*, 1912, lix, 864-866.

9. Graser, E.—*Das falsche Darmdivertikel. Arch. f. klin. Chir.*, 1899, lix, 638-647.

10. Graser, E.—*Ueber multiple falsche Darmdivertikel in der Flexura sigmoides. Munch. med. Wchnschr.*, 1899, xxii, 721.

11. Hansmann.—Quoted by Beer.

12. McGrath, B. F.—Intestinal diverticula: Their ætiology and pathogenesis. *Surg. Gynec. and Obst.*, 1912, xv, 429-444.

13. Mayo, W. J., Wilson, L. B. and Giffin, H. Z.—Acquired diverticulitis of the large intestine. *Surg., Gynec. and Obst.*, 1907, v, 8-15.

14. Mayo, W. J.—Diverticulitis of the large intestine. *Jour. Am. Med. Assn.*, 1917, lxix, 781-785.

15. Moynihan, B. G. A.—The mimicry of malignant disease in the large intestine. *Tr. Clin. Soc.*, Lond., 1907, xl, 31-43.

16. Telling, W. H. M.—Acquired diverticula of the sigmoid flexure, considered especially in relation to secondary pathological processes and their clinical symptoms. *Lancet*, 1908, i, 843-850; 928-931.

17. Telling, W. H. M. and Gruner, O. C.—Acquired diverticula, diverticulitis, and peridiverticulitis of the large intestine. *Brit. Jour. Surg.*, 1917, iv, 468-530.

18. Virchow.—Quoted by McGrath.

19. Wilson, L. B.—Diverticula of the lower bowel: Their development and relationship to carcinoma. *Ann. Surg.*, 1911, liii, 223-231.

THE TREACHEROUS SYMPTOMS CAUSED BY AN APPENDIX IN THE PELVIS

W. A. Lewis, M.D., C.M.
Barrie, Ontario

IT may seem superfluous to attempt to add anything original to the already vast amount of literature on the subject of appendicitis, but even if this article sets forth nothing new it is at least based on the knowledge gained by personal observation of actual cases in which the diagnosis was decidedly obscure.

The volume of the sacred law tells us "there is nothing new under the sun", but the more one compares the surgical findings with the sometimes obscure clinical picture the less one is apt to view the adage in its literal sense.

Although appendicitis is one of the most common of surgical diseases and one whose classical signs and symptoms are familiar to all medical men, it is often one of the most difficult to diagnose, especially when the appendix is misplaced. The characteristic phenomena of an ordinary attack are usually partially, and may be wholly absent, and an entirely different chain of symptoms develop when the appendix is located at the brim or in the cavity of the true pelvis. Doubtless there are fewer mistakes being made now-a-days, since the disease is very much better understood, and the importance of an early disgnosis is recognized, but the common occurrence of the malady makes it vitally important to detect the atypical, as well as the typical, type.

The appendix, like people, influences its associates and may be judged accordingly. Therefore, if the appendix associates itself with the rectum and the bladder in the male, or any of the different pelvic organs of the female, we must bear in mind the clinical symptoms that are apt to be created thereby, so that if one is called early in an attack to see a patient suffering from pain, either high or low in the abdomen accompanied by vomiting, but with absence of localized tenderness, inquire whether there is frequency of micturition or painful defecation. One or both of these symptoms frequently occurs. There may be no rigidity at first, but as the case develops the muscular tension begins to make its appearance low down on the right or sometimes in both recti muscles. This is usually soon followed by tenderness over the right inguinal region or immediately above the pubes. There is sometimes slight flexion of the right thigh. I have found temperature and pulse rate of very little aid in these cases, nor similarly the dry, furred tongue; in fact, by the time there is fever with dry, furred tongue and accelerated pulse, pus is usually present, and the other clinical signs are well in advance, and have made the condition fairly apparent. In my series of cases there has been very little diarrhœa except as might be explained by the patient having taken strong purgatives. Russell Howard notes this occurrence, however, in about 25 per cent. of cases. The history of general abdominal discomfort or chronic dyspepsia, without other apparent cause, is very suggestive of a chronic appendix in the pelvis. The classical signs are not so well marked and are tardy in appearance, due apparently to the slow absorption by the pelvic peritoneum.

In making a differential diagnosis many other conditions must be borne in mind, such as calculus of the ureter or bladder, the various forms of intestinal obstruction, gonococcal peritonitis in the female, and the many other inflammatory conditions of the pelvis or abdominal cavity. The history of some characteristic feature, such as blood in the urine, the presence of a mass in hernia, a vaginal discharge, etc., will usually direct one to a correct conclusion.

But upon what must we depend to make a reasonably certain early diagnosis of appendicitis?

1. After getting complete history of the case and making a careful examination of the patient, do not neglect to make a rectal examination. This is of great importance and there is no reasonable excuse for omitting it. It is surprising how often you will be able to detect a long, tender mass high up in front of the rectum. Whether or not a mass is felt there is usually pain or marked discomfort referred to the lower right side of the abdomen, which is accentuated by bimanual pressure.

2. Whenever possible have a white blood count made. A leucocytosis suggests at once an in-

flammatory condition and consequently narrows down materially the possible diseases causing the symptoms.

3. Do not under any circumstances give morphia. As long as you have the slightest cause for suspicion of appendicitis, intestinal obstruction, or other acute abdomen, avoid narcotics. Any acutely inflamed appendix, whether in the normal or abnormal position, requires immediate operation. The operation can never be too early, but it may be too late. If the pain is severe apply heat, give emetics and temporize by various means, but do not disguise the symptoms and thereby delay the possibility of an early operation by giving morphia.

4. If it seems necessary to wait for further signs and symptoms to make a diagnosis, stop all food, keep the patient in the Fowler position and watch closely for tenderness or rigidity low down on the right rectus.

I shall not weary you with case reports of a series of cases, but will merely describe a couple to emphasize the difficulties of diagnosis.

Case 1. T. W. Patient complained of indefinite pain in abdomen, vomiting, gas on stomach, no diarrhœa. This was a telephone call, answered by Dr. R. J. Spence, of Danforth Avenue, who was with me at the time. Dr. Spence suggested visiting the patient, but he refused, stating he had often had these attacks of indigestion while out West, and only required medicine. Bismuth subnitrate powders were prescribed. I inquired over the telephone later in the day and learned that the pain was gone and he was feeling much improved. Four days later he appeared at my office complaining of weakness, lack of energy, occasional pain in the abdomen but no nausea, and that he was sleeping poorly. Gave also a history of constipation, painful defecation and frequency of micturition. Temperature 101 2-5°, pulse 88. Slight tenderness, but doubtful rigidity over lowest part of right rectus. Urine analysis normal, patient sent to hospital. W.B.C., 24,600. Rectal examination disclosed a long, tender mass high up between rectum and bladder. Immediate operation was advised. Patient refused, but consented the next day owing, apparently, to the pain not having been relieved.

Operation. Low mid right rectus incision. Found cæcum low and bound down. Ileum went straight down into pelvis. Appendix crossed behind it and traced to a mass between bladder and rectum. About one dram of pus escaped. Thickening of the appendix extended on the cæcum, appendix raised, used electric cautery for removal, plain cat-gut on stump, two large split tube drains placed in wound. Patient made good recovery.

Case 2. A. L. Patient of Dr. Corcoran, Elmvale. A pain soon after dinner, patient took a dose of baking soda, which usually relieved, about 3 p.m. Pain became worse now in epigastrium, and over left side of abdomen; vomited, had bladder irritation with pain in penis. About 6 p.m. Dr. Corcoran was called, gave morphia, which relieved fairly well until noon next day. Dr. Corcoran called Dr. A. T. Little, of Barrie, in consultation, who advised immediate removal to the hospital. On his arrival in the evening, I found tenderness low down on both sides of abdomen, but slightly worse on right side. This was aggravated by rectal examination but no mass was detected. White blood cells, 16,000. Operated upon immediately, low right rectus incision; free fluid encountered at once, packed off general peritoneal cavity, mopped out seropus, appendix gangrenous and ruptured, raised from pelvis, removed by aid of electric cautery and by using cat-gut on stump. Three large drains placed in wound. Patient made good recovery.

I might quote other cases, but enough has been said to show the difficulties of diagnosis, the value of rectal examination, the inadvisability of morphia and to prove the worth of the white blood count.

In closing I may say that in chronic cases of abdominal distress I have found the barium meal and *x*-ray examination of value. While the appendix is not always demonstrated the location of a very low cæcum may be very significant, and may lead to the correct interpretation of an indefinite collection of symptoms. Remember that the inflamed appendix in the pelvis gives one of the most treacherous types of the disease due, no doubt, to the slower absorption of toxines by the pelvic peritoneum, and to the consequent lateness or irregularity in the development of symptoms.

BRIGHT'S DISEASE IN PRACTICE

H. B. ANDERSON, M.D., R. W. MANN, M.D., and N. C. SHARPE, M.D.

Toronto, Ontario

SINCE Richard Bright, in 1827, correlated the presence of albuminuria and dropsy with disease of the kidneys, *Bright's* disease or nephritis, has been a subject of perennial interest to both the physician and the layman. These names, however, have included conditions of such wide clinical and anatomical latitude, that they convey no precise meaning to the physician to serve to guide him either as to the ætiology, the course, prognosis or treatment of the condition. The attempts once made to associate various clinical types of albuminuria and other urinary and systemic findings with definite anatomical changes in the kidneys, failed of verification at autopsy so frequently that a classification of Bright's disease, on anatomical grounds, has been recognized as inadequate. There is no definite relationship to be established between the nature and degree of morbid change in the kidneys and the attendant clinical phenomena, including findings by urinalysis.

The following represents a more recent classification of nephritis, though it is recognized that there is no hard and fast line demarcating the various classes.

1. Tubular nephritis.
   (a) Mild—albumen—from a trace to a considerable amount; casts—hyaline, granular.
   (b) Severe—albumen; casts—hyaline, granular, epithelial, fatty; œdema.
2. Glomerular nephritis.
   (a) Acute with œdema, albumen, hæmaturia and tendency to uræmia.
   (b) Subacute—few renal symptoms; hypertension.
   (c) Marked hypertension, fixation of specific gravity, nocturnal polyuria, eye symptoms, tendency to uræmia, anæmia, etc.
3. Renal sclerosis.
   (a) Primary—following acute interstitial.
   (b) Secondary—following glomerular and mixed nephritis.
   (c) Arterio-nephritis or benign sclerosis.
   (d) Arteriosclerotic atrophy.
4. Nephrosis—a term applied to the albuminuria secondary to poisoning by phosphorus, mercury, various toxæmias and febrile conditions, as typhoid fever, Grave's disease, etc.

The study of nephritis has more recently been approached from the functional side and tests have been introduced to estimate the *functional* capacity of the kidneys, not alone as an index to their excretory efficiency but as a measure of the degree of pathological change affecting them. Certain limitations of these functional tests may be mentioned.

1. They focus too much attention on the kidneys alone, thus tending to minimize widespread systemic changes associated with certain forms of Bright's disease.

2. They attach importance often to remote effects rather than emphasize the causes which underlie them.

3. The kidneys are complex in their structure and function, different parts showing a selective capacity in dealing with the elimination of different materials, metabolic or extraneous, so that the capacity of the organs to excrete any one of these cannot too rigidly be accepted as an index to the organic functional capacity as a whole. This applies equally to normal products of excretion and presumably to drugs injected for purposes of testing functional capacity.

Of the latter, the phthalein test has been most widely accepted as of real clinical value.

The response of the kidneys to the ingestion of fluids by a corresponding change in the specific gravity of the urine, is taken as an evidence of the elasticity of normal renal function.

The response of the kidneys to a diet, definite as to quantity and composition, is readily carried out and represents a valuable addition to our methods of estimating renal function.

Nocturnal polyuria, a compensatory process, designed to carry off the excess of waste materials which have accumulated during the day, and the failure of the normal function of the

Read before the Medical Section of the Academy of Medicine, Toronto, March 30th, 1920.

kidneys to concentrate the urine, evidenced by a fixed, low specific gravity, are well recognized as important evidences of functional impairment.

Chemical examination of the blood, to determine the total non-protein nitrogen and its various constituents, creatinine, uric acid, urea-nitrogen, etc., is of value as an index to the degree of nitrogenous retention, thus assisting the clinician in arriving at a prognosis in a given case. Repeated examinations serve as a check on the progress of a case and the efficiency of treatment, and as an indication for the necessity of restriction or non-restriction of proteins in the dietary. Further, chemical blood examination and functional kidney tests are necessary in distinguising the hypertension of Bright's disease from essential hypertension or hyperpiesis (Allbutt), the absence of nitrogenous retention in the latter, permitting a more liberal protein dietary than would ordinarily be permissible in the former.

These tests also enable one to distinguish the uræmia associated with retention of the end products of protein metabolism, in which eliminative treatment and a high carbohydrate—low protein diet are indicated, from the type in which no retention is demonstrated by present methods.

They are of more value in chronic than in acute cases, where the therapeutic indications are for rest, to spare the kidneys by restriction of fluids and the allowance of a very limited amount of bland diet. By these functional tests we obtain more precise data, and a fuller grasp of a case, but our own experience would not accord them a practical value beyond more ordinary clinical methods which, properly, they should supplement but not replace, It must not be forgotten that marked degrees of nitrogenous retention and greatly increased creatinine are accompanied by other clinical evidences of toxæmia.

The relative value of these newer methods, as compared with those longer known, will be best exemplified in the lantern slides which we shall show you later. It cannot be too strongly emphasized, however, that these methods and the other data of a comprehensive clinical investigation, are in no wise mutually exclusive, but both have their value in elucidating a case.

The estimation of chlorides is of use in enabling one to determine whether chloride retention is a factor in an attendant œdema and if their restriction in diet is called for. We have not found much practical advantage from the estimation of the CO_2 tension of the blood and alveolar air as an index to acid intoxication in ambulatory cases, though they may be in the more advanced and bedridden. In forming an opinion as to the seriousness of a given case, the blood pressure, degree of anæmia, the condition of the heart, and the information obtained by the opthalmoscope, are all of the greatest importance. Marked degrees of hypertension, severe anæmia, evidences of cardiac decompensation, and above all albuminuric retinitis are ominous signs in chronic cases. I (Anderson) have seen many cases of the latter, but never one that lived a year after the condition was first observed.

The general systemic condition, therefore, is equally or more important than the renal evidences of disease in forming a prognosis.

As in all clinical laboratory procedures, functional and other tests must be considered in relation to other clinical phenomena.

A point of the greatest practical importance is to determine whether there is a removable cause such as syphilis, or a chronic focal infection about the teeth, tonsils, sinuses or elsewhere, to account for the persistence, recurrence or progressiveness of renal symptoms. There is no doubt that the tendency of nephritis to be progressive, is often due to the persistence of the original cause of trouble, and the possibility of finding and removing such cause has, therefore, an all important bearing on prognosis, necessarily of greater practical moment than the evidences of functional impairment due to such infection.

Apart from the more difficult laboratory procedures, I am convinced that simpler and easily applied methods are often neglected or imperfectly carried out. I refer to the measuring of the twenty-four hour specimen, estimating separately the day urine and the night urine, taking the specific gravity of a mixed twenty-four hour specimen, comparing the fluid intake with the output, estimating the degree of acidosis by the administration of alkalis (Sellard's test). Albuminuria, in itself, has not any definite prognostic significance. The transient intermittent or orthostatic albuminuria of adolescence does not, in itself, carry any serious significance. The importance of albuminuria therefore, should be estimated in connection with all the other associated clinical phenomena.

Osler, in 1911, published a paper in the *New York Medical Journal*, on "The Advantages of a Trace of Albumen and a few Tube Casts in the Urine of certain Men over Fifty Years of Age". I have always thought that a series of reports of mine (Anderson) on the urinalysis of a case

in which he had a deep personal interest, prompted him to write this paper. The patient had a persistent, moderate albuminuria, with some hyaline and granular casts and red blood corpuscles. With my knowledge at that time, of necessity largely formed by text-books, I had been lead to express a rather gloomy prognosis. This patient has since lived a strenuous public life, and I frequently see him twenty years later, at seventy-five years of age, walking jauntily past my office, smoking a cigar, on his way to business. In his paper, Osler quoted an ancient authority, who stated that "The Pisse is a harlot and a liar" and generally denounced the "pisse-prophets", maintaining that a trace of albumen and a few casts served at times as the "red lights" which warned of danger ahead, to be averted by a timely application of the brakes in the way of more rational living. This opinion, of course, accords with one's wider clinical experience, and warns one not too readily to prophesy early disaster on limited data of varying significance.

Since that time, I (Anderson) have seen many cases of marked and long continued albuminuria, with casts, eventually clear up. One case was that of a Hebrew—long familiar as a visitor to the hospitals in Toronto—over fifty years of age, who for years had up to 10 per cent. bulk of albumen in the urine, and who went practically blind from detachment of the retinæ, for which he went to Vienna to consult Fuchs. He was an excellent patient, and followed instructions as to diet, etc. implicitly. I eventually lost track of him for some years, and when he presented himself for re-examination I found that the urine had entirely cleared up, he had no anæmia, blood pressure was normal, and apart from almost complete blindness, he was physically in excellent condition.

Some years ago, I was consulted in regard to a man twenty years of age, a commercial traveller, who had gradually developed in November, 1908, general anasarca when on a business trip in British Columbia. He was unable to be brought home until the following April, at which time he presented extreme general anasarca, the urine was reduced to 8 oz. per diem, and laden with albumen and hyaline and granular casts, though he was not extremely anæmic. His blood pressure was normal and the heart was good. He had effusion into both pleural and peritoneal cavities. His condition continued as above with fluctuations until the following autumn, when it began gradually to clear up and by January, he was so well that he was accepted by a local insurance company on a twenty-year endowment policy.

In my experience, these favourable cases are unaccompanied by extreme anæmia, cardiac symptoms, hypertension or retinitis, and often a removeable cause can be discovered. No insurance referee will underestimate the serious significance of albumen and casts in the urine, regarding their presence or recurrence at intervals over a long period as a grave impairment which will disqualify the applicant for insurance. Clinically, however, we must recognize the fact that all cases of albuminuria are not progressive, complete cures may occur, and even the persistence of albumen if unassociated with other signs, as before mentioned, is not in itself necessarily incompatible with long years of useful life.

In the diverse conditions connoted by the term "Bright's disease", what is required is a complete investigation of the patient, including his hereditary tendencies, environment, diet, etc., a search for focal infections, syphilis or other source of systemic poisoning, for all systemic or organic evidences of disease, as anæmia, hypertension, cardio-vascular disease, and all other information available by clinical and laboratory methods. Upon the broad basis of the information thus obtained, we will be best enabled to envisage the whole condition, and to prognosticate and treat most intelligently.

In the following cases selected from a large number the clinical and laboratory data are contrasted to exemplify their relative importance.

To refresh the memory the following tables of normal values is appended.*

I.—F. E. Age fifty-seven, manufacturer, height, 5 feet, 8 inches. Weight, present, 260 lbs., greatest, 278 lbs. January 12th, 1920.

Clinical data.

Hæmoglobin, 100 per cent.
Dyspnœa, marked.
Teeth, septic.
Tonsils, enlarged.
Strep. Viridans.
Staph. Albus.
Œdema of extremities.

*Non Protein Nitrogen 25 to 35 mgms. per 100 c.c. of blood.
Urea N. 12 to 23 mgms. per 100 c.c. of blood.
Creatinine 1 to 3 mgms. per 100 c.c. of blood.
Chlorides in the urine 10 to 15 grams per diem.
Phthalein excretion 60 to 80 per cent. in two hours.
Normal daily range of specific gravity of the urine about 10 points.
700 c.c. and over would constitute nocturnal diuresis though obviously no fixed quantity can be stated as a normal upper limit, but many normal cases exceed this.

Cardio-vascular.
Blood pressure, 190-120.
Apex at nipple line.
Compensation, poor.
Vessels, normal.

Fundi—normal.

Urine—Acid.
1023.
Albumen, marked—5 per cent. bulk.
No casts.
Leucocytes.

Laboratory data.

Response to Nephritic Test Diet.

Hour	Quantity	Specific Gravity
12 p.m.	150 c.c.	1019
2 p.m.	82 c.c.	1023
4 p.m.	224 c.c.	1020
6 p.m.	120 c.c.	1021
8 p.m.	120 c.c.	1023
Total day urine	696 c.c.	

Daily range of specific gravity 4 points.

Total night urine, 8 p.m. to 8 a.m., 465 c.c.
Specific gravity 1023.
Night urine normal in amount and well concentrated.
N.P.N. 80 mgms. per 100 c.c. (marked increase)
1 month later 53 mgms. per 100 c.c.
2 months later 33 mgms. per 100 c.c.

Phthalein, 1st hour, 28 per cent.
2nd hour, 13 per cent.
Total 41 per cent.

1 month later, 30 per cent.
2 months later, 56 per cent.
Wassermann, strongly positive.

With clearing up of the marked oral sepsis, the albuminuria and œdema gradually disappeared, the blood pressure dropped and the cardiac symptoms improved—in all a fairly satisfactory recovery has taken place. A difficult problem was to decide on the therapeutic indication of the positive Wassermann and this was met by careful intermittent administration of hydrarg. cum creta. In this case the ordinary clinical data were evidently of greater value than the laboratory, though the latter helped to elucidate the clinical picture, indicating the importance of considering the data side by side rather than looking upon them as mutually exclusive. The marked increase in phthalein output and the decrease in non protein nitrogen are evidences of improvement and these changes were coincident with the general progress of the case.

II.—G. E. Age fifty, farmer. Weight, present, 240 lbs., greatest, 242 lbs. March 24th, 1917.

Clinical data.

Hæmoglobin, 80 per cent.

Cardio-vascular.
Blood pressure, 200-124.
Apex, normal.
Muscle, deficient.
Dyspnœa on slight exertion.
Arteries, O.K.

Urine—Acid.
1020.
Albumin, trace.
Casts, hyaline, granular.

Laboratory data.

Response to Nephritic Test Meal.

Hour	Quantity	Specific Gravity
12 p.m.	95 c.c.	1022
2 p.m.	70 c.c.	1025
4 p.m.	80 c.c.	1022
6 p.m.	90 c.c.	1021
8 p.m.	130 c.c.	1020
Total day urine	465 cc..	

Daily range of specific gravity 5 points.

Total night urine, 8 p.m. to 8 a.m., 810 c.c.
Specific gravity, 1012.
Large in amount.
Fairly well concentrated.

October 27th, 1919.

Creatinine, 1.7 mgms. per 100 c.c. } within
Urea N. 29 mgms. per 100 c.c. } normal limits.

November 8th.
Creatinine, 2·14 mgms. per 100 c.c.
Urea 42·8 mgms. per 100 c.c.
Phthalein, 1st hour, 25 per cent.
2nd hour, 10 per cent.
Total 35 per cent.

Wassermann was negative though there was a history of a previous attack of syphilis and addiction to alcohol.

The patient made temporary improvement but eventually developed influenzal pneumonia and died December, 1919. The low phthalein output, nocturnal polyuria and fixation of specific gravity are of interest, though the clinical data evidences the seriousness of the case.

III.—H. H. P. Age thirty-one, bookkeeper. Weight, present, 143 lbs., greatest, 170 lbs. April 8th, 1918.

Clinical data.

Onset 3½ months previously following "Flu."

Hæmoglobin—90 per cent.
Œdema of extremities.
Breath—uræmic—vomiting.

Cardio-vascular.
Blood pressure, 175-120.
Apex—normal.
Compensation—satisfactory.
Vessels—normal.

Fundi—discs—swollen.
hæmorrhage in spots.

Urine—Acid.
1010.
Abumin, 5 per cent. bulk.
No casts.
Leucocytes.

Laboratory data.

Response to Nephritic Test Meal

Hour	Quantity	Specific Gravity
12 p.m.	375 c.c.	1011
2 p.m.	100 c.c.	1010
4 p.m.	170 c.c.	1010
6 p.m.	150 c.c.	1010
8 p.m.	115 c.c.	1011

Total day urine, 910 c.c.

Daily range of specific gravity 1 point.

Total night urine, 8 p.m. to 8 a.m., 240 c.c.
Small in quantity and dilute.
Weak.
N.P.N. 153·6 mgms. per 100 c.c.

Creatinine 8·23 mgms. per 100 c.c., marked excess.
Phthalein 10 per cent. in 2 hours—extreme reduction.
Outcome—died July 10th, 1918.

In this case both clinical and laboratory data indicated the seriousness of his condition. The absence of nocturnal polyuria is notable, also the fixation of specific gravity at a low level, the marked increase of creatinine and low phthalein output.

IV.—H. H. Age thirty-seven, comptroller. Height, 5 feet, 8 inches. Weight, 155 lbs. July 14th, 1920.

Patient had passed for Life Insurance the previous year.
Began as an acute hæmorrhagic nephritis, April, 1919.
Onset of illness perhaps six weeks or two months before.

Clinical data.

Hæmogobin, 70 per cent.
Teeth—very septic.
Tonsils—definite infection.
Œdema—generalized.

Cardio-vascular.
Blood pressure, 130-80.
Apex—normal.
Compensation—good.
Vessels—good.

Urine—Dark, smoky or red.
Acid.
1016.
Oliguria, at first—8 oz. per diem.
Albumin 8 per cent. at first (bulk).
Casts—in large numbers.
Red blood cells—in large numbers.
White blood cells.

Septic teeth extracted June, 1918.
Tonsils treated by Dr. Royce.
Complete recovery after one year.

Laboratory data.

Response to Nephritic Test Meal.

Hour	Quantity	Specific Gravity
12 p.m.	115 c.c.	1015
2 p.m.	85 c.c.	1015
4 p.m.	80 c.c.	1018
6 p.m.	85 c.c.	1019
8 p.m.	95 c.c.	1016
Total day urine	460 c.c.	

Range of specific gravity 4 points. Total night urine 8 p.m. to 8 a.m., 480 c.c.
Specific gravity, 1017.
Normal amount.
Dilute.

N.P.N. of blood 58·1 mgms. per 100 c.c., (on June 26th).
N.P.N. of blood 42·2 mgms. per 100 c.c., (on July 14th).
Phthalein, 1st hour, 30 per cent.
2nd hour, 10 per cent.
Total 40 per cent. (June 20th).
Total 45 per cent. (July 14th).

Wassermann—clearly negative.

The reduced hæmoglobin noted at the beginning was accounted for by the hæmorrhage from the kidneys. The importance of removing foci of infection in teeth, tonsils or elsewhere is well demonstrated by this case.

V.—Mrs. M. Age forty-seven, housewife. Weight, 160 lbs. March 20th, 1920.

Clinical data.

Hæmoglobin—90 per cent.
Teeth—septic.
Tonsils—enlarged.
Staph. aureus.

Cardio-vascular.
Blood pressure, 240-130.
Apex—nipple line.
Mitral systolic murmur.
Vessels—good.

Fundi—normal.

Urine—Acid.
1028.
No albumen.
No casts or red blood cells.

Laboratory data.

Response to Nephritic Test Meal

Hour	Quantity	Specific Gravity
12 noon	80 c.c.	1028
2 p.m.	65 c.c.	1025
4 p.m.	54 c.c.	1029
6 p.m.	32 c.c.	1030
8 p.m.	30 c.c.	1030
Total day urine	261 c.c.	

Daily range of specific gravity 5 points.

Total night urine, 8 p.m. to 8 a.m., 1030 c.c.
Specific gravity, 1030.
Small in amount and concentrated.

Non-protein nitrogen of blood 30 mgms. per 100 c.c.

Phthalein, 1st hour, 48 per cent.
2nd hour, 14 per cent.
Total 62 per cent.

Wassermann—negative.

In this case the laboratory findings, reduced daily excretion, absence of nocturnal polyuria, the capacity of the

kidneys to concentrate the urine, the absence of nitrogenous retention and the response to the phthalein test, were favourable. The oliguria and high specific gravity suggested the freer drinking of water, while the absence of nitrogenous retention contraindicated too rigid restriction of proteins in the diet.

April 7th, 1920. Gallstones were removed from cystic duct, and cholecystectomy performed by Dr. Wallace Scott. She improved rapidly. Blood pressure fell to 180-130.

May 3rd, 1920. Left hospital feeling very well; tonsils still infected.

July, 1920. After over-exertion, she developed acute hæmorrhagic nephritis, marked hypertension, cardiac decompensation, double basal pneumonia. Temperature up to 103° F. or more, is now gradually improving; has not been sufficiently well to have tonsillar enucleation done.

In this case the clinical findings indicate a more serious condition than the laboratory, which has been borne out by subsequent progress of the case.

VI.—B. G. Age forty-eight, manufacturer. Height, 5 feet, 8 inches. Weight, present, 163, greatest, 170. November 26th, 1918.

Clinical data.

Hæmoglobin—90 per cent.
Breath—uræmic.
Teeth—septic.

Cardio-vascular.
Blood pressure, 245-145.
Apex—normal.
Muscle—weak.
Dyspnœa—moderate.
Temporal arteries, tortuous.
Fundi—double choked discs.

Urine—Acid.
1024.
Albumin, trace.
Casts—granular, hyaline.

Laboratory data.

Response to Nephritic Test Meal.

Hour	Quantity	Specific Gravity
12 p.m.	100 c.c.	1015
2 p.m.	60 c.c.	1019
4 p.m.	90 c.c.	1019
6 p.m.	100 c.c.	1020
8 p.m.	80 c.c.	1020
Total day urine,	430 c.c.	

Daily range in specific gravity 5 points.

Total night urine, 8 p.m. to 8 a.m., 850 c.c.
Specific gravity, 1010.
Large in amount and dilute.

N.P.N. 40 mgms. per 100 c.c.
Urea 20 mgms. per 100 c.c.
Phthalein, 1st hour, 36 per cent.
2nd hour, 12 per cent.
Total.....48 per cent.

Wassermann—negative.

The nocturnal polyuria, moderate fixation of specific gravity at a high level and moderate reduction in phthalein output are of interest though the clinical data gave clearer evidence of the seriousness of the case. The patient died.

VII.—J. McC. Age forty-four, clergyman. Height, 5 feet, 10 inches. Weight, present, 157, greatest, 188. February 28th, 1920.

Clinical data.

Hæmoglobin, 95 per cent.
Septic teeth.
Enlarged tonsils—pus—Strep. viridans.

Œdema of lower limbs.
Dyspnœa.

Cardio-vascular.
Blood pressure, 220-150.
Apex—normal.
Muscle—normal.
Vessels—thickened.

Fundi—arteries tortuous.

Urine—Acid.
1015.
Albumen.
No casts of blood cells.

Laboratory data.

Response to Nephritic Test Meal

Time	Quantity	Specific Gravity
12 p.m.	185 c.c.	1015
2 p.m.	100 c.c.	1017
4 p.m.	150 c.c.	1011
6 p.m.	165 c.c.	1015
8 p.m.	50 c.c.	1017
Total day urine.....	650 c.c.	

Range in specific gravity 6 points.

Total night urine, 8 p.m. to 8 a.m., 840 c.c.
Specific gravity, 1015.
Large in quantity and dilute.
1 month later—range of 12 points in specific gravity. with night urine small and well concentrated.

N.P.N. 32 mgms. per 100 c.c.

1 month later—30 mgms.

Phthalein, 1st hour, 39 per cent.
2nd hour, 13 per cent.
Total.....52 per cent.

1 month later, 58 per cent.

Wassermann—clearly negative.

The septic teeth and tonsils were removed and the patient showed marked improvement, which has continued since taking up his duties again.

ŒSOPHAGEAL STRICTURES

D. W. Graham, M.D., F.A.C.S.

Swift Current Clinic, Swift Current, Saskatchewan

CICATRICAL stenosis of the œsophagus, following upon the swallowing of corrosives, possesses considerable interest because of its rather frequent accidental occurrence, the rapid and consistent development of the stenosis, and also because of the varied appliances and the methods used in its treatment.

Many of us have occasion to treat such cases and not all of us have at hand such appliances or are adequately conversant with the methods of treatment to undertake the task without some hesitancy.

The condition is as a rule not difficult to manage, providing that care and gentleness be coupled with a thorough knowledge of procedure. It is also of convenience to the patient to remain near his home while he is undergoing the course of treatment which will require months and probably years before one is quiet certain that a cure has been established.

It is for this reason that I have reviewed the subject, and have presented what I would consider a case in the extreme, for treatment.

I will first consider a few details with respect to the landmarkings of the œsophagus. "It begins at a point behind the lower border of the cricoid cartilage on a level with the sixth cervical vertebræ; and joins the stomach about three-quarters of an inch after passing through the diaphgram. The lower level of the œsophagus is on a level with the spine of the twelfth dorsal vertebræ. In the normal adult the upper level of the œsophagus is about six inches (15 cm.) from the incisor teeth, ten inches (28 cm.) to where the left bronchus crosses in front of the œsophagus, sixteen inches (40½ cm.) to the lower end of the œsophagus."

"The normal œsophagus presents two distinct constrictions, one situated at its beginning and one at a point where it crosses the left bronchus. Both constrictions are of the same size, and will admit without injury an instrument with a maximum diameter of four-fifths of an inch."

The course of the œsophagus is not always a straight one, but may present certain irregularities such as sacculations and tortuous undulations. These are usually considered as abnormal, but should be looked for in the treatment of such cases.

Œsophageal constrictions due to the swallowing of corrosives have been found at the following levels:

Guisez reports thirty-eight cases, most of them being located at the cardia.

Chevalier Jackson reports twenty-eight cases, eighteen being in the middle, six at the level of the hiatus, four near the crico-pharyngeus.

Charles J. Imperatori reports one at 15 to 16 cm. from the upper teeth, one at 27 cm. from the upper teeth, one at 2 cm. below the cricoid. And a second in the same case 34 cm. from the upper teeth.

Thomas Hubbard reports two cases, aged one year and five years, near the cardia, one case, six years, in the lower portion 8 to 10 cm. from the cardia.

Nathan W. Green reports one case, eight years, in the lower 4 inches (10 cm.) of the œsophagus.

E. M. Ebert reports a case in a child of four years at the upper border of the manubrium sterni.

One case in my own personal observation at the level of the left bronchus and a second lower down.

From the above one might judge that a cicatrical stenosis might occur at any point along the œsophageal tract, and that the point of election for such a condition to occur might vary with the point at which the peristaltic spasm might obstruct the descent momentarily.

"Strictures may arise after any inflammation produced by the swallowing of foreign bodies such as fish bones, coins, pins, plates of false teeth, etc., the impaction may be followed by ulceration, suppurative cellulitis, or even perforation and death from hæmorrhage; owing to one of the large vessels being opened."

The condition may also arise from specific causes such as tubercle, syphilis, thrush, or diphtheria.

Strictures may also be congenital in nature.

Simple strictures arise more frequently from the swallowing of corrosive poisons.

The healing of a gastric ulcer may also cause a stricture near the lower end of the œsophagus.

It is with stenosis due to the swallowing of lye that I propose to deal in this paper.

The swallowing of lye being particularly prone to produce a corrosive affect upon the upper digestive tract, regardless of the quantity, it has been suggested by several that lye containers be labelled as poisons.

Lye is more frequently swallowed by the child because of it being so carelessly handled and permitted to lie about where it is extremely accessible.

Shortly after its ingestion, œdema develops and the mucous membrane becomes macerated and soon peels off. As the acute inflammation subsides the symptoms of obstruction may entirely pass away, to be followed by gradually increasing difficulty in swallowing, which may not appear for some time and is not attended by pain. Fluids and soft foods are most easily swallowed, and these patients learn to chew their food well, to eat slowly and to swallow small quantities at a time.

Dilatation above the stricture often occurs and food accumulates in the dilated part, causing frequent regurgitation of food and mucus. As the obstruction increases the nutrition begins to suffer and a severe grade of emaciation and anæmia is finally reached, ending in death from starvation unless relief is obtained. Thomas Hubbard reports a case with the following unusual features: "Strictures involving the lower three or four inches of the œsophagus, the canal being very tortuous, with small sacculations between the constrictions."

The diagnosis of œsophageal strictures can be made by the administration of a bismuth or barium meal and radiography; two views should be made, a lateral and an antero-posterior view being taken, and the extent and character of the stricture studied stereoscopically. The fluoroscope may also be used. There is always danger in doing blind bouginage, as the tube may be easily perforated and a fatal cellulitis set up. At this juncture it might be well for me to report the case of a man, age forty-five, who came to me in 1913 complaining of having swallowed an unmasticated piece of beef, and that it had been lodged in his gullet and that it had been there for about three hours. I attempted to pass it by the use of an œsophageal bougie, but failed after several careful attempts. It was located at about the level of the left bronchus. I had him placed in the hospital for further attention. After a couple of hours he began to complain of excruciating pain in the epigastrium, his pulse became very rapid and of poor quality and symptoms of collapse were evident. Morphia and atrophine were administered without relief. I then decided to do a gastrostomy and explore the cardiac end of the œsophagus with my finger, and upon doing so I discovered that it was very difficult to enter. I dilated it thoroughly and had the patient brought back to the ward. He made a good recovery and could swallow food the following morning, and soon took soft foods and finally solids. I then closed the gastrostomy wound after a period of five days. Fourteen days later he developed a right sided empyema, which was drained in the usual way by rib resection. The wound took a long time to close but rapidly did so after the use of vaccines. He has been in excellent health ever since.

In the survey of the literature on œsophageal strictures I find that many different procedures have been adopted in their treatment. Mr. Kendal Frank used an Otis dilating urethrotone with blade removed which was screwed up and withdrawn fully expanded, this was done laterally and antero-posteriorly; an œsophageal bougie could then be passed from above.

Abbe, of Newport, advised what he calls the "string" method in the treatment of dense fibrous strictures. A gastrostomy having been previously performed, a small gum elastic bougie is guided through the stricture from below up into the mouth, and a stout silk ligature passed in the same way. This silk ligature being see-sawed backwards and forwards, when the stricture was felt to yield. Large bougies are then passed.

Dunham caused a string to be swallowed and then used the Abbe method.

Ochsner draws a rubber tube under tension through the stricture, when the tension is taken off the tube, it expands and so dilates the stricture; in the course of a few days a larger and also double tubes are introduced. He is said to obtain good results.

Hubbard states: "That for safety and precision the Sippy method is ideal. The essentials are: First. Know your measurements; Second, be sure you are well into the stomach with wire guide and then go clear through with the properly selected olive bulb on the cable. If you try too large an olive and fail to get through you may

pinch a band of stricture tissue between two of the olives on extraction, rather risky but even at that sometimes beneficial. The successful dilatation of strictures of this class makes possible, but does not ensure a cure. It is important to decide on the maximum dilatation, hold it there, and in children try to keep up with growth. It should be twenty-six in a three year old child and from thirty-five to forty in an adult. In holding a maximum dilatation the author favours passing a specially adapted olive bulb at frequent intervals, rather than the flexible bougie; one knows positively when one is through the stricture; with the flexible bougie, one is never quite sure. In cases in which the stomach has been opened, the stomach tube should be retained after dilatation is well advanced, to give confidence to the patient, and also in cases there is considerable trauma from dilatation, the œsophagus may be rested by direct feeding until inflammatory reaction has subsided."

The writer's case was a child of twenty months who had swallowed lye three months previously; ever afterwards he has had difficulty in swallowing; while at first he could swallow without vomiting it caused him to cry and he would take food with difficulty. About one month later he would regurgitate most of the food taken; liquids only being taken and retained and that in very small quantities. He gradually became pale and emaciated, when the parents for the first time became alarmed. The child seemed normal in every way apart from the palor and emaciation. A small sized olive pointed bougie was passed without great difficulty and others up to size 18 Fr. This was done once a week for three weeks. Regardless of the fact that the parents were warned of the necessity of returning regularly for treatment, they did not appear for two months, at which time the child was in a seriously aggravated condition, unable to retain even water or saliva. Repeated attempts were made at passing bougies of various sizes but all resulted in failure. The child being *in extremis* and in order to save its life a gastrostomy was deemed advisable. A thorough examination was made when it was found that a distinct sacculation existed above the level of the left bronchus and merely a suspicion of a little of the barium meal was seen to trickle through. We then tried to get the child to swallow a silk thread, but after repeated trials it seemed impossible. Gastrostomy was performed and retrograde dilatation carried out without great difficulty in the following manner: Following out a procedure very similar to that used by Abbe, a small filiform bougie was passed from below upwards through the stomach to the mouth. To the end of the bougie were fastened two coarse silk cords; these were drawn through the stricture and out through the mouth. To the lower end of one was interwoven a parachute contrivance consisting of four similar sized cords which were fastened to a circular cord in the same fashion, on which rode the various bougies until a 26 Fr was passed, retracting each bougie alternatively with the obturator.

These manœuvres were accomplished with but little difficulty. It was also discovered that a second obstruction was encountered at the lower end of the œsophagus. The gastrotomy wound was closed in the usual way.

Subsequent passage of a full size bougie for this particular age was done once a week for two months and later twice monthly and the interval being gradually lengthened up to the present. The result so far has been very satisfactory.

The object in using the four-corded parachute was to assist dilatation and do away with the see-saw method of Abbe.

The four cords are kept under tension by traction from below on the handle of the obturator. Thus the olive is guided through the stricture by the cords, each assisting in the process of dilatation.

The conclusions arrived at by the review of the various methods are as follows:

1. It would seem that complete stenosis of the œsophagus is a very rare condition.

2. One should make sure that the patient returns for treatment and that too long a time does not intervene between the various bouginages. It might also be wise to have him return once every six months for a period of several years or probably for life.

3. The earlier the stage in which dilatation can be done and the younger the patient the better the result.

4. The method of procedure for the different types of cases may be classified as follows:

(a) Those in which the stenosis will permit the passage of a bougie with or without the use of the œsophagoscope.

(b) Those in which one cannot successfully use an œsophagoscope. In these cases a Mixter's cord should be swallowed and the Sippy method adopted.

(c) Where there is almost a complete closure with a large sacculation above the stricture and there is existing a condition of water hunger. In this case it might be well to do a gastrostomy and a retrograde dilatation carried out, assisted, if necessary, by bouginage from above, under guidance by direct vision.

The worst type of case encountered is one where there exists multiple strictures, with sacculations in a tortous passage. In this type one should not wait too long before bouginage is carried out. The firm strictures at the upper levels may be dilated through the œsophagoscope and then retrograde process may enable us to complete the cure.

Slow dilatation seems less dangerous than the more rapid methods.

It has been found that in the use of the Sippy method that where formerly olive-tipped bougies were threaded over the silk cord as a guide, a stiffer guide would be much better, and piano wire having a small eyelet welded to its end has been used.

It would therefore seem advisable where bouginage fails with the assistance of the œsophagoscope, to adopt some such method as suggested by Sippy and its modifications.

On the other hand one is liable to failure in certain cases and the retrograde route will have to be adopted.

References:

1. Eberts, E. M.—*Can. Med. Assoc. Jour.*, 9-640-614, July, 1919.
2. Keipo, George F.
3. Laryngoscope.—29; 538-552, September, 1919.
4. Green, Nathan W.—*Ann. Surg.* 67; 231-232, 1918.
5. Hubbard, Thomas.—*Jour. Am. Med. Assoc.*, 71; 1706-1710, November 23rd, 1918.
6. Imperatori, Charles J.—Laryngoscope 27: 796-799, 1917.
7. Jackson, Chevalier.—St. Louis, Laryngoscope Co., 1915.
8. Gatewood.—*Surg. Clin.*, Chicago 4: 69-75, February, 1920.

The Fifth Annual Session of The American Congress on Internal Medicine will be held at Baltimore, Md., week of February 21-26, 1921.

The activities of the Congress will be largely clinical. Ward-walks, laboratory demonstrations and group or amphitheatre clinics will be conducted daily by members of the Medical Faculties of The Johns Hopkins and The Maryland Universities.

Further information may be secured by addressing The Secretary-General, 1002 N. Dearborn Street, Chicago, Ill.

THE PREVALENCE OF MALNUTRITION IN THE PUBLIC SCHOOL CHILDREN OF TORONTO

ALAN BROWN, M.B. and G. ALBERT DAVIS, B.A., M.B.

PREVIOUS to the war very little attention was paid to the question of malnutrition in older children, but in the examination of recruits so many men were found to be unfit for military service as a result of conditions following malnutrition that attention was then brought to bear on the condition as it appeared in children. It was found in the drafts for the United States army that one man out of five was unfit for active military service on account of physical disabilities brought about by malnutrition. Unfortunately we have not the corresponding figures for the Canadian army, although it is probable that the same proportion of disability would be present in our own country.

Surveys to ascertain the extent of malnutrition existing among school children have been made in various places. In New York, in the borough of Manhattan, of approximately 175,000 children who were examined 2·15 per cent. were found to be undernourished[1]. A recent writer[2] mentions 40 per cent. of a certain school in Kansas City as being undernourished. Many other surveys have been made in England and in the United States, but as far as we are aware no such work has been undertaken anywhere in Canada. With the idea of determining how much malnutrition was present in Canadian cities a survey was made of some of our Toronto schools.

There are various standards that one may adopt in determining the existence of malnutrition. The one which we have chosen is the relationship of weight to height, irrespective of age. The height and weight chart employed by us was prepared from measurements by Boas and Burke for older children[3] and for the earlier years from approximations of records by Holt[4]. Altogether the heights are averages of 45,151 boys and 43,298 girls, and weights of 68,000 boys and girls. It is to be noted that the chart is different to that of Wood's where age is taken into consideration. The reason for adopting the former set of standards in preference to Wood's is, that we feel the correct method is to disregard the age of the child, and to consider his height and weight only.

The survey was made in conjunction with the Department of Public Health of this city, through which department the nurses, who did the actual measuring and weighing, were supplied. Heights were taken with boots on, and an allowance made for the height of the heels. A little experience in this matter soon makes one quite proficient. Similarly, with the weights, allowances of one-half to one and a half pounds were made for boots according to the size and appearance of the latter.

The original intention in making the survey was to choose four schools representing the different types of our school population. To these four schools, however, has been added a fifth, where a mental survey of each child was being carried on under the direction of the Canadian National Association for Mental Hygiene. In this instance measurements and weights were made by the same individual making the mental survey, and these records have been added to our own.

The first school surveyed was York Street, where there is practically eighty per cent. foreign population. This school is situated in the downtown warehouse and small shop district. In this locality the population is very cosmopolitan, and includes Chinese, Japanese, Russians, Jews, Italians, and so on. Following this the children of Brown School were weighed and measured. This school is located in one of the best residential districts of the city, and contains children of parents in good financial circumstances. Withrow School, consisting of children of middle class parents, and Dufferin School, with children of the lower type of English speaking people, were the remaining two schools chosen. Western Avenue School, where the mental survey was also made, is in a good residential district; and socially stands between Brown and Withrow Schools.

In estimating the amount of malnutrition in the

From the Department of Pediatrics, University of Toronto, and the Out-Patient Department Hospital for Sick Children.

various schools, two standards have been employed. Emerson[5] states that a child 7 per cent. or more underweight for his height is malnourished, while Holt[6] considers a child 10 per cent. or more underweight for his height up to ten years of age and 12 per cent. from ten to sixteen years as belonging to this class. Both determinations have been made. In Tables 1, 2, 3, 4, and 5 will be seen in order the results obtained in the various schools. For convenience the results of each school have been placed together as seen in Table 6. Our results in these schools have been so striking that an estimate based on the relationship of weight to age was made in two schools, Withrow and York, and the results are seen in Tables 7 and 8. In Table 9 the results have been tabulated according to the grade in school in order to see whether there existed any difference in the amount of malnutrition present at the various ages. Finally in Table 10 will be seen the results of the mental survey made in conjunction with the nutritional survey. This was done to determine if possible whether there was any relationship between malnutrition and mental backwardness, as evidenced by the Binet-Simon method.

When we come to analyze our results we see that the greatest amount of malnutrition is present in the children of middle class people of native birth. The well-to-do, as also the foreigners, show the least amount of malnutrition. In Table 9 we see that malnutrition varies only to a slight extent in the different grades, and that it does not tend to decrease as the child gets older. From Table 7 it will be seen that the children in Withrow School, which probably holds true for the children of other middle class schools, are tall for their age; while the foreigners in York Street School (Table 8) are short for their age. These latter findings confirm us in our belief that the correct method of determining existent malnutrition is by the relationship of weight to height, irrespective of age. We, therefore, feel that the height and weight chart used in this survey is the best obtainable at the present time, and in the majority of instances shows the correct state of the child's malnutrition.

The mental survey made in one school of 336 children confirms the results found by Blanton[7] in the public schools of Trier, Germany; namely, that malnutrition, even when prolonged, affects to a very slight degree the intelligence of a child, as determined by the Binet-Simon method. However, children suffering from malnutrition shows a lack of physical and nervous energy which results in poor school work, and generally affects behaviour so that these children often appear listless and stupid. This latter finding is in agreement with the opinions of those handling classes of malnourished children, whose experience has been that as the state of a child's nutrition improves so does his mental condition.

Summary

1. Of 2,843 children examined, 1,256 or 44 per cent. were 7 per cent. or more underweight and 751 or 26 per cent. were 10-12 per cent. or more underweight. Some may not be disposed to consider a child 7 per cent. underweight as malnourished, but a child 10 per cent. or more underweight is surely in a serious condition, and needs attention.

2. Estimating our total school population as 79,000, 26 per cent. or 20,540 are undernourished and in a serious state of health.

Note.—The authors are indebted to E. J. Pratt, Ph.D. for the mental survey conducted by him under the direction of the Canadian National Association for Mental Hygiene, and to the Misses Wheeler and Emory and the nurses in the various schools attached to the nursing staff of the Department of Health, for the routine weighing and measuring of the children.

References:

1. "Malnutrition among school children," in weekly Bulletin of the Department of Health, City of New York, vol. 7, March 9th, 1919, page 75.
2. Brown.—*Jr. Amer. Med. Assoc.*, 1920, page 27, vol. 75, No. 1.
3. U. S. Commissioner of Education Report 1896-7, page 1541, Bulletin No. 10, 1910; *American Jr. Psychology*, vol. 9, page 253; B. T. Baldwin.—"Physical Growth and School Progress," U. S. Education Bureau, 1914.
4. Holt.—"Diseases of Infancy and Childhood," 1917, page 20.
5. Emerson.—"A Nutrition Clinic in a Public School," *Amer. Jr. Dis. of Children*, vol. 17, 1919, page 251.
6. Holt.—"Standards for growth and nutrition of school child," *Arch. of Ped.*, vol. 35, 1918, page 339.
7. Blanton.—"Mental Changes in Children of Germany," *Mental Hygiene*, July, 1919, page 343.

Table 1

YORK ST. SCHOOL

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Kindergarten.....	25	36	14	20	68
Junior & Senior 1st	18	25	9	212	70
Junior Second.....	5	17	1	3	29
Senior Second.....	10	29	4	11	34
Junior Third.....	11	27	7	17	40
Totals.....	69	28	35	14	241

TABLE 2

BROWN SCHOOL

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Kindergarten	31	32	18	19	95
Junior First	29	32	16	18	89
Senior First	28	43	21	32	65
Senior Second	25	20	13	10	127
Junior Third	38	24	3	2	158
Senior Third	43	31	26	19	136
Junior Fourth	39	31	21	17	124
Senior Fourth	25	28	13	15	88
Totals	258	29	131	14	882

TABLE 3

WITHROW SCHOOL

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Kindergarten	39	51	25	32	76
Junior First	49	56	36	41	86
Senior First	40	56	29	40	71
Junior Second	32	45	17	24	70
Senior Second	54	67	33	41	80
Junior Third	42	51	23	28	82
Senior Third	59	56	38	36	104
Junior Fourth	28	53	22	42	52
Senior Fourth	19	38	9	18	49
Totals	362	54	232	34	670

TABLE 4

DUFFERIN SCHOOL

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Kindergarten	51	75	39	57	68
Junior First	95	71	66	49	133
Senior First	66	62	40	38	105
Junior Second	43	57	25	33	75
Senior Second	45	58	25	32	77
Junior Third	32	43	12	16	74
Senior Third	35	50	20	29	69
Junior Fourth	26	53	14	28	49
Senior Fourth	12	33	3	8	36
Junior Fifth	11	57	8	42	19
Senior Fifth	3	33	2	22	9
Totals	419	58	254	35	714

TABLE 5

WESTERN AVENUE SCHOOL

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Junior First	8	28	3	11	28
Senior First	3	20	2	13	15
Junior Second	24	46	17	32	52
Senior Second	7	33	6	28	21
Junior Third	26	33	8	10	77
Senior Third	42	60	24	34	70
Junior Fourth	25	54	12	26	46
Senior Fourth	13	48	7	26	27
Totals	148	44	79	23	336

TABLE 6

School	7% or more per cent.	10% or more per cent.
York Street 80% foreign	28	14
Brown School	29	14
Western Avenue School	44	23
Withrow School	54	34
Dufferin School	58	35

TABLE 7

WITHROW SCHOOL—WEIGHT TO AGE

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Kindergarten	20	26	10	13	76
Junior First	20	23	12	14	86
Senior First	16	22	12	17	71
Junior Second	15	21	8	11	70
Senior Second	25	31	13	16	80
Junior Third	20	24	12	14	82
Senior Third	31	29	20	18	107
Junior Fourth	19	31	13	21	62
Senior Fourth	17	28	11	18	60
Totals	183	26	111	16	694

TABLE 8

YORK STREET SCHOOL—WEIGHT TO AGE

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Kindergarten	25	36	15	22	68
Junior First	5	16	4	12	31
Senior First	20	51	16	41	39
Junior Second	8	27	6	20	29
Senior Second	11	32	6	17	34
Junior Third	14	35	7	17	40
Totals	83	34	54	22	241

TABLE 9

MALNUTRITION—ACCORDING TO GRADE IN SCHOOL

Grade	7% or more	Per cent.	10% or more	Per cent.	Total
Kindergarten	146	47	96	31	307
Junior First	199	49	130	32	406
Senior First	137	53	92	35	256
Junior Second	104	46	60	26	226
Senior Second	141	41	81	24	339
Junior Third	149	34	53	12	431
Senior Third	179	47	108	28	379
Junior Fourth	118	43	69	25	271
Senior Fourth	69	34	32	16	200
Junior Fifth	11	57	8	42	19
Senior Fifth	3	33	2	22	9
Totals	1256	44	731	26	2843

TABLE 10

Average Intelligence Quotient for 94 normal and overweight children—101 per cent.

Average Intelligence Quotient for 45 7% to 10% underweight children—101 per cent.

Average Intelligence Quotient for 104 10% or more underweight children—98 per cent.

DIPHTHERITIC ULCERATION OF THE SKIN

H. A. Dixon, M.B.
Toronto

PATIENT, P. W., aged twenty-five, entered hospital with deep ecthymatous ulcers on legs and adenitis in left groin.

Date of Admission. July 6th, 1918.

Previous Illness. Scabies, July, 1917.

History of Case. Four months previous to entering hospital. patient noticed pustules in the left lumbar area, also in the region of the knees and ankles and in the left inguinal furrow. The interesting feature was that one month previous to entering hospital, the pustules developed into ulcers, and, two weeks later, patient complained of a sensation of numbness in the shin bones.

Photograph of ulcers, left leg. Taken by Dr. C. P. Brown.

On Admission a large ulcer was present in the left inguinal furrow, also five ulcers inferior to the left knee and one pustular hair follicle on the anterior surface of the left ankle. Three ulcers were clustered about the right ankle.

Close Examination of the inguinal ulcer showed it to measure 4 cm. x 2.5 cm. with its long axis in the inguinal furrow. The surface was covered by a dark green, thick membrane which was firmly adherent to the base. Removal of a small piece of the membrane showed fine bleeding points. The margin was heaped up, slightly undermined, and surrounded by an angry indurated area. The other ulcers were smaller, round, and had a more punched-out appearance. The bases were covered with less adherent dark green slough.

Laboratory Findings. Smears from the largest ulcer showed bacillus diphtheriæ of the beaded type with metachromatic granules. Cultures were acid in glucose and dextrin—non acid in saccharose.

Animal Test. Guinea pig died in eight days with diphtheritic paralysis.

Nose and throat swabs from the patient were negative to diphtheria bacilli.

Culture from the pustule—left ankle—showed staphylococcus aureus.

Wassermann negative:

Urine—acid, specific gravity, 1,020; albumin negative, sugar negative, microscopic negative.

Examination of Nervous System. Pupils reacted to light and accommodation: knee jerks active on both sides.

Electrical Reaction in Legs. The responses to Faradism and Galvanism were brisk. The condensor results were normal except the extensor brevis digitorum which was ten times slower than normal. There was not any reaction of degeneration.

As this case occurred in the army, the history of infection is interesting.

Previous to patient's admission to hospital there had been much sickness in his battalion, chiefly of the type described as colds. Several of the men were sent to hospital as cases of diphtheria. His "sore legs" were dressed by the same attendants who looked after the other sick including the isolation cases. Apparently an original lesion had been secondarily infected with diphtheria bacilli from carriers or mild cases among those who were suffering from colds.

Treatment. Bichloride of mercury compresses were at first applied without any apparent change. The ulcers healed rapidly, however, following the use of diphtheria antitoxin and normal saline compresses.

I am indebted to Dr. Duncan Graham and Dr. C. P. Brown for the bacteriological findings; to Dr. E. P. Lewis for the electrical reactions.

OBSERVATIONS FROM THE DERMATOLOGICAL CLINIC OF THE DEPARTMENT OF SOLDIERS' CIVIL RE-ESTABLISHMENT OF CANADA, TORONTO BRANCH

D. KING SMITH, M.D.

Toronto

EARLY in the war the Dominion Government instituted the Department of Soldiers' Civil Re-establishment. An important branch is that of the Medical Service. Under this service in the large centres, clinics have been established in the various branches of medicine and surgery.

As a soldier is entitled for a year, from the date of his discharge from the army, to free medical attendance and treatment, the clinics are well patronized.

During the past seven months nearly three hundred patients have attended the clinic for diseases of the skin, which affords an opportunity to compare certain aspects of the diseases as met with in service and those in civilian practice.

While on active service in 1917 I made notes of my experience in diseases of the skin covering a period of two years. Some of the observations then made have been mentioned by various writers. Will discuss the subject under the various diseases.

Scabies. The cases were of an exceedingly severe type, characterized by marked pyogenic infection. Ecthymatous lesions were very common with a marked degree of ulceration. The ulcers were very resistant to treatment. The hands in a large percentage of the cases presented a severe dermatitis.

At present there are numerous severe cases, but the vast majority do not differ from those usually met with at a clinic.

Pediculosis. Very seldom seen now.

Pyogenic Infections. With the army impetigo contagiosa was very frequent and severe, although not differing from that seen in civilians.

Sycosis. This condition was fairly common, more so than in civilian practice. The vast majority of the cases were of a severe type and exceedingly resistant to treatment. All of the patients had a course of vaccine therapy, before being discharged from the army. The histories show that in a number of them improvement resulted for a while and then relapses followed.

The results of vaccine treatment have been disappointing. *X*-ray treatment has proved the most successful although quite a percentage, even under this treatment, has recurred. Patients suffering from sycosis often need careful constitutional treatment along with fresh air, and when once built up the response to the local treatment is most noticeable.

Pyogenic Dermatitis. The majority of these cases now coming under observation are due to discharging sinuses and wounds. Even after the sinuses and wounds have healed a chronic dermatitis remains. After months of careful treatment the dermatitis persists. This no doubt is due to the lowered vitality of the part affected. The condition is most frequently met with over the tibia.

In amputational cases, especially of the thigh, in many cases a dermatitis is present. I have ascribed it to the wearing of the amputational sock, as it necessarily has to be made of heavy wool and in many cases two socks have to be worn. Clinically the condition is similar to an intertrigo. No treatment is of value unless the artificial limb is discarded for a time.

Furunculosis. Very common in the returned man and often severe. In many cases the patients have suffered for a long period from a discharging wound. They are very succeptible to pus infection. The best results are obtained by building up the patient with tonics, good food and fresh air. Many of the cases failed to respond under local treatment and vaccines alone, but improved rapidly under good hygienic surroundings and tonics.

Diseases of So-called Nervous Origin. In 1917 I noted that the freedom from this class of disease was most astonishing. When one realizes the great nervous strain and exposure under which the troops were, it really is remarkable.

In hundreds of diseases of the skin I have only seen two cases of dermatitis herpetiformis, two or three of lichen planus and only two cases of alopecia areata.

Now that the war is over and the men have returned to the old mode of living, I find a great increase in these diseases. Out of the three hundred cases there have been twelve of dermatitis herpetiformis, lichen planus ten, and alopecia areata fifteen, a vast increase in percentage to those met with in service.

One case of lichen planus deserves special mention. Patient aged forty-six, while in charge of an elevator accidentally killed a man, a month after he developed a most severe attack, practically all of his body showing lesions. During the four weeks, from time of accident, he was greatly depressed, suffered from insomnia and could eat very little. Previous to the accident the man showed no nervous symptoms.

There is a peculiar nervous condition of many of the demobilized men. The chief symptoms are restlessness, insomnia and a slight tremor of hands. This nervous condition may be a predisposing factor and accounts in some degree for the increase of the diseases of so-called nervous origin.

I hardly think the percentage of these cases is larger than in a civilian clinic, but the contrast is marked to that of active service.

Pruritus. Many patients complain of a pruritus, especially of the abdomen and thighs. There are no lesions present except excoriations. As most men suffered from a prolonged seige of pediculosis while serving, I ascribe a large number of these cases to a mental impression.

Epidermophyton Infection. Is exceedingly common compared to pre-war days. This may partially be due to the fact that we are now better acquainted with the various phases of the diseases. As the cases under discussion were contracted in service it is reasonable to suppose that there must have been some predisposing causes or factors acting.

As the majority of cases showed the lesions in parts naturally most moist as the axillæ, inner sides of thighs and between the toes, I think the wearing of heavy underwear and heavy socks were very important factors in this infection.

Have had severe cases under observation in amputational cases of the thighs. The condition was kept up by reinfection from the amputational sock. After the socks were discarded, improvement rapidly took place.

During the warm weather last summer I had twenty-two cases of tinea cruris at clinic. They were of all grades of severity. The fungus was demonstrated in eight cases. As the weather became cooler a marked decrease of number of cases was noted and now as the weather is getting warmer the number of cases is increasing and some of the old cases are recurring. I think this course is the common experience in these cases.

Erythrasma. Eight cases have been under treatment at the clinic. In seven the lesions were confined to the inguinal region. One case presented many patches on chest, abdomen, arms, and legs.

Lopus Erythematosus. This condition has not been very commonly met with. At present have six cases under treatment.

Three of the patients state condition appeared soon after being exposed to mustard gas. Immediately on exposure face became swollen, inflamed and very painful. In one case while under my care showed an acute dermatitis of hands and forearms and a typical lupus erythematosus of face. Patient stated the condition of face and hands both began after exposure to the gas.

Am of the opinion that external irritation is a causative agent in many cases of lupus erythematosus. In the three cases mentioned the written histories of case state they followed gas exposure. Recently, in a private case, a lady was exposed to the sun and face was badly sunburnt, a marked lupus erythematosus developed.

Psoriasis. In my experience on active service the percentage of this disease compared to civilian practice was very small. The number of cases attending clinic now is fully equal to that of any out-door clinic.

Many men having psoriasis when enlisted improved greatly under the military training, and in many the condition completely disappeared only to relapse now that they have resumed, as in many cases, a sedentary life.

Unless a change to an out-door life is made in many cases of psoriasis the ordinary methods of treatment fail.

Recently I have had under treatment two very severe general cases of psoriasis, both of which resisted the usual treatment. Profiting from the experience in the army both were advised to go out into the woods or country and take lots of exercise. The advice was taken and the improvement was most marked.

Syphilis. The instruction which the men of the army received in this disease will prove most

beneficial to the community in general. They appreciate the extreme seriousness of the disease and the results which may follow.

I have been impressed how on the slightest appearance of any skin lesion they present themselves at the clinic for examination and vary often come for a Wassermann test.

If somewhat similar methods of instructing the public could be adopted, it would go a long way to control the spread of this disease.

PRIMARY AND SECONDARY NITROUS OXIDE SATURATION FOR RELAXATION AND AS A TEST OF THE PATIENT'S CAPACITY FOR OPERATION

E. I. McKesson, M.D.

Toledo, Ohio

General Considerations

IN the primary, or induction, stage of nitrous oxide oxygen anæsthesia, it is the usual practice to administer 100 per cent. nitrous oxide to produce unconsciousness as soon as possible by a primary saturation of the blood with the anæsthetic gas. Very soon, however, a small amount of oxygen must be mixed with the nitrous oxide to prevent the jactitations and other manifestations of acute anoxæmia. Now, if some fixed proportion of oxygen is decided upon it will be found too small for some and too great for others, since patients differ in their mixture requirements. All of this is well known to gas-oxygen users. Preliminary or what may be called primary saturation with nitrous oxide is about as far as many gas-oxygen anæsthetics are carried. If the operation requires deeper relaxation it is the practice of many anæsthetists to resort either to a mixed gas-oxygen-ether, or to an ether sequence.

In a primary saturation only the actively circulating blood is saturated before oxygen must be administered. There remains in the muscles, and in all other tissues, considerable volumes of nitrogen and oxygen, which, in the early minutes of narcosis, enter the blood stream and dilute the nitrous oxide, thereby preventing deeper anæsthesia. In order to displace more of the non-anæsthetic gases in the body with nitrous oxide, the technic to be described as secondary saturation has been devised.

Any general anæsthetic relaxes muscle, providing some coincident by-product or effect does not counteract this function.

In nitrous oxide anæsthesia we may have sufficient anoxæmia to produce muscular spasm when there would have been relaxation had the anoxæmia been prevented. Yet by the usual technic it has not always been possible to prevent the anoxæmia and still have sufficient nitrous oxide concentration to relax the patient.

Clinical Observations.

Eleven or twelve years ago, in my early experience with gas-oxygen, occasionally patients were accidently overdosed with nitrous oxide, stopping respiration and requiring resuscitation with oxygen. I was impressed with the extreme ease and quickness of the restoration by inflating the lungs once or twice with oxygen. The phenomenon was so unusual when compared with the difficulties which followed overdosage with ether or chloroform that it made a profound impression.

In attempts to secure deep anæsthesia and muscular relaxation these observations became more commonplace and it was soon learned the cyanosis, a dilated pupil, and apnœa were easily corrected by inflating the lungs once or twice with

---

Read at the sixth annual meeting of the Interstate Association of Anæsthetists, Pittsburg, October, 1920. Awarded one of the National Anæsthesia Research Society's first prizes for meritorious research, and published at recommendation of Canadian Society of Anæsthetists.

oxygen, and that while these signs could not be disregarded nor neglected for a moment when they became apparent, nevertheless, the patient was in no serious danger if oxygen could be put into the lungs after saturation had occurred.

Another phenomenon was observed in this connection which has since been a most important means of securing a flacid abdominal wall When fully utilized it has made it possible to obtain for the patient the full advantage of a pure gas-oxygen anæsthesia, and to eliminate the unpleasant sequelæ which even a small amount of ether produces. The phenomenon was this: When the patient had been reoxygenated after saturation, complete muscular relaxation followed, and a patient who, prior to that time had been too rigid for easy abdominal exploration became ideal from the surgeon's point of view.

At first the fear of accident prevented the intentional utilization of this procedure in clinical practice and only in unintentional overdosing were further observations made. The patients were studied from many angles, careful records of pulse, respiration, blood pressures, pulmonary ventilation, rebreathing, and the mixture of gas-oxygen were tabulated on every patient during the narcosis, that an opportunity to study a case when one presented might not be lost.

These clinical observations of blood pressures unexpectedly exploded the theory that gas-oxygen elevated the blood pressure and, therefore, the danger from this factor was eliminated as early as 1911 and reported.

After three or four years observations of these occasional cases the conclusion was reached, that a patient might be crowded to the limit of saturation without great danger if oxygen could then be instantly forced into the lungs. The method was tried in those cases at first, in which ether was clearly contraindicated and in whom sufficient relaxation by the usual technic for pure gas-oxygen was not readily obtainable. Gradually its use has been extended to include *any* case in which relaxation of abdominal muscles is desired.

Many times the patient has been brought from what appears to be a well developed fourth stage with widely dilated fixed pupils, and deepest cyanosis, complete spastic apnœa, and general board-like rigidity, into a most beautiful placid relaxed pink patient in from ten to twenty seconds, with every appearance of normal slumber.

While this illustrates the remarkable flexibility of nitrous oxide and oxygen and its wonderful safety, it also illustrates the important clinical fact that a patient may be more completely saturated with nitrous oxide than has been generally practiced or thought possible.

The Principle of Nitrous Oxide Saturation

The principle of nitrous oxide saturation is not radically different from ether or chloroform saturation, It requires, of course, a much higher concentration for a few moments than is required with the latter agents, and to secure this concentration, oxygen is temporarily cut off or markedly reduced below the proportion which will be administered after the saturation has been accomplished.

In most gas-oxygen anæsthesias as given in the past, the patients have been only partly saturated, and reflexes or rigid muscles resulted just as occurs under light anæsthesia with ether, chloroform, or other general anæsthetic.

The extraction specialists of years ago and today produce primary saturation and approach secondary saturation in many of their muscular patients before beginning to extract teeth. Had they required the relaxation needed in abdominal surgery, and possessed the means for using oxygen which we have, the technic for secondary saturation, no doubt would have been developed by them, because they were not afraid of cyanosis, which is the stumbling block in the minds of ether or chloroform trained anæsthetists and surgeons. The extractionist soon learns that nitrous oxide (without oxygen) usually produces anæsthesia slightly later than the onset of cyanosis and he, therefore, rarely removes the inhaler until his patient is fairly blue. Yet under such a technic with all sorts of patients he has established a record for safety with nitrous oxide which has not been approached by any other anæsthetic agent.

The fear of cyanosis by the surgeon and anæsthetist has been one of the most powerful influences in holding back the progress of nitrous oxide and oxygen. It is the most natural thing to administer oxygen when the skin becomes dusky, and stop the further development of narcosis by so doing. General ignorance concerning the signifiance of cyanosis itself and how much cyanosis from a certain cause will be tolerated for certain periods of time, are subjects worthy of investigation. Cyanosis as a sign indicating the depth of anæsthesia, is not only absolutely valueless but misleading and dangerous

because one patient may be cyanotic and still conscious, while another may be pink, overdosed and dying from the same mixture of nitrous oxide and oxygen.

Illustrative Case Report

The following unusual and remarkable case in my recent experience illustrates: Mrs. C., a middle aged woman had twelve infected teeth to be removed. She had had four or five blood transfusions, one recently, for an anæmia of four years' standing. The hæmoglobin index was 27 cent. and the red cell count 2,250,000. She was excitable, weak, and spent much of her time in bed. Nitrous oxide-oxygen was selected by the consultants as the safest anæsthetic for this patient. The usual technic of induction with 100 per cent. nitrous oxide was begun, January 5th, 1920, but at the end of the third inhalation while the ear and nails were distinctly pink (they had been previously quite pale) respiration stopped, the eyelids opened, and the pupils had dilated until only a narrow ring of iris could be seen. The muscles were completely *relaxed* in every part of the body. The pulse was weak but regular and easily felt.

The lungs were promptly inflated or about half filled with oxygen twice, and within ten seconds the iris began to retract and within a few more seconds respirations resumed regularly.

On account of the few breaths required to thus overdose the patient, it was evident that the nitrous oxide would need to be highly diluted with oxygen to prevent a recurrence and, therefore, the apparatus was set for 30 per cent. oxygen and only 70 per cent. nitrous oxide. But the same signs recurred within five or six breaths, and again she was resuscitated with two inflations of oxygen. Now, 50 per cent. oxygen and 50 per cent. nitrous oxide were administered and after several breaths the pupils began to slowly dilate and respirations became weaker. After a breath of 100 per cent. oxygen was administered, to prevent the further development of over dosage, 40 per cent. oxide was next tried with 60 per cent. oxygen. This proved to be the ideal mixture for the patient and no further difficulty was experienced, while the operation proceeded.

The operation lasted twenty minutes in which the teeth were removed, the alveolar process trimmed smooth with rongeurs, the gum margin trimmed and sutured so as to restore mastication by artificial dentures within a few days.

Semi-consciousness following the operation lasted for thirty minutes (instead of a few seconds) which was no doubt due to her unusually weak condition and to her anæmia. There has been a gradual improvement in the general condition of the patient up to the present time.

Besides illustrating the fact that a patient may be overdosed with very low percentage of nitrous oxide without showing cyanosis, this extreme case emphasizes the importance of the true signs of anæsthesia as a guide to the anæsthetist, and the necessity for being prepared to resuscitate a patient when respirations are accidently stopped by over saturation with nitrous oxide, regardless of the proportion of oxygen which may have been used up to this time. Another unusual but expected phenomemon occurred in this case, the moment when overdosage occurred each time, as well as at other times, there was no muscular rigidity, but extreme relaxation instead. This was due to the fact that we had the nitrous oxide in sufficient concentration to produce relaxation and also enough oxygen to prevent anoxæmic spasticity. At no time was there anoxæmia of cyanosis to produce spacticity. In the usual case when saturation is first attained the coincident anoxæmia causes the muscles to become board-like or spastic, but relaxation comes promptly when sufficient oxygen is restored to them.

Primary and Secondary Cyanosis

Cyanosis may be classified as primary and secondary; primary due to changes in the blood itself, and secondary due to local or external causes capable of increasing the oxygen depletion of the blood. Cyanosis is due to the deoxidation of oxyhæmoglobin to reduce hæmoglobin, it is a physiological process carried beyond the usual limits.

Blood usually leaves the lungs about 95 per cent. saturated with oxygen, therefore having only 5 per cent. unsaturated. There will be a larger portion of it unsaturated if æration is interfered with by inspired mucous, by blood, a restricted airway, or by a reduction of the oxygen administered as in anæsthesia.

That cyanosis *per se* is not incompatible with life is illustrated in morbus cæruleus, aviation, pneumonia, and in bathers exposed to cold air.

In old age when metabolism is lower, less oxygen is consumed in the tissues, and less cyanosis results from oxygen restriction. The old folks are usually ideal patients for gas-oxygen, easily handled and rarely requiring secondary saturation

to produce relaxation. The young adult on a similar oxygen percentage in the anæsthetic mixture usually shows a greater unsaturation and more cyanosis.

The rate of flow of the blood may be altered so as to increase unsaturation or cyanosis in terminal toxæmias such as in peritonitis or endocarditis, or again from a deficient septum between the ventricles.

Then the blood itself greatly influences cyanosis. The anæmic patient in a given mixture of nitrous oxide and oxygen, producing normal anæsthesia, obtains enough oxygen to oxidize the small quantity of hæmoglobin she carries, while the full blooded drayman on the same mixture would probably be cyanotic because the oxygen would be sufficient only to oxidize 50 to 75 per cent. of his hæmoglobin.

In well marked anæmia with less than a 50 per cent. hæmoglobin index cyanosis is rarely seen; with an index of 30 per cent. or less cyanosis cannot be produced before death.

It is, therefore, obvious that the fear of cyanosis is sometimes well founded and at other times unwarranted. Its absence, however, is not a sign of safety.

Under ether or chloroform, cyanosis is usually a serious omen—an indication of serious heart embarrassment, or restricted respiration from over dosage. It is not usually due to a restriction of oxygen administered or inhaled.

In thousands of administrations degrees of cyanosis have been produced for variable lengths of time under nitrous oxide with no ill effects, which, if seen under chloroform or ether, would, in a fair percentage of cases, result fatally. *The difference is in the cause.*

In operative cases one must be able to determine the cause of cyanosis, if it occurs, and whether it is controllable or not, before concluding that it is detrimental. Some patients will tolerate quite deep cyanosis for a few minutes, a moderate amount for hours and a slight cyanosis for long periods if due merely to a restriction of oxygen administered to the lungs for absorption.

The Signs of Anæsthesia

The only true signs of anæsthesia clinically, which are of value, are those manifested through the patient's muscular system. Movement, or its absence is significant. In the accompanying table colour is tabulated principally to show its uselessness as a guide to counteract the often repeated statements in anæsthetic literature regarding its supposed value.

The third stage of anæsthesia as described in the text-books, is here divided into three planes: *light, normal, and profound.* The third plane or profound anæsthesia, borders upon the fourth stage and merges into it with the (d) group of signs. The signs of the third plane are the guides to secondary saturation, as well as the limits of anoxæmia, which are momentarily permissible in producing secondary saturation.

The Technic of Usual Induction, or Primary Saturation

Anæsthesia is induced by administering 100 per cent. nitrous oxide until the first muscular phenomenon of oxygen hunger is observed. This may be and usually is characterized by a change in character or rate of respiration accompanied by a little snore, a twitch of the eyelid, a jerk of the hand or foot, or some similar anoxæmic muscular contraction, clonic in character.

This is the patient's first signal for oxygen, and marks the moment when oxygen should be added to the nitrous oxide in sufficient proportions or percentage to prevent, temporarily, the further development of anoxæmia. What this percentage of oxygen shall be is determined by the susceptibility of the patient, which is roughly determined by the length of time or the number of breaths of pure nitrous oxide which the patient has inhaled, before anoxæmia develops. If short the percentage of oxygen may be greater than if anoxæmia comes on slowly. But in the usual case, with the first anoxæmic sign, 5 to 6 per cent. oxygen is then mixed with the nitrous oxide, increasing or diminishing it as the signs of anæsthesia may indicate while attempting to attain the normal plane of anæsthesia. Thus, the first two or three minutes of narcosis will pass before it will be determined whether the normal plane can be secured without secondary saturation or not, whether it will be necessary to further saturate with nitrous oxide in order to rob the tissues of their excess of oxygen and nitrogen, and thus prepare for muscular relaxation by increasing the amount of nitrous oxide in the body.

Technic of Secondary Saturation

If relaxation has not taken place when other signs indicate that the patient is in normal anæsthesia and if relaxation is essential to the success

Light Anæsthesia	Normal Anæsthesia	Profound Anæsthesia
Due to too much oxygen in the mixture.	Due to a properly balanced mixture of N2O-O.	Due to too much N20 in the mixture or to partial obstruction of respiratory passages.
Respiration (a) Superficial slow breathing usually regular. (b) Prolonged inspiration. (c) Phonation due to reflexes or pain. (d) Holding breath, grunting.	**Respiration** (a) Full "machine like" respirations. Regular and faster than normal. (b) Inspiration and expiration nearly equal. (c) No phonation. (d) Continuous uninterrupted respiration.	**Respiration** (a) Irregular rhythm (sobby) usually slower than normal. Spasmodic. (b) Prolonged expiration. (c) Phonation due to muscular spasm of vocal cords. Often crowing. (d) Cessation of respiration from spasm of muscles of exhalation.
Muscular Phenomena (a) Movements or rigid muscles. (b) Facial expression of pain or consciousness. (c) Nausea, very rarely. (d) Reflex, or voluntarily resistance.	**Muscular Phenomena** (a) Immobile and relaxed, but having normal muscular tonus. (b) Expression of normal sleep. (c) Quiet. (d) Quiet. Relaxed.	**Muscular Phenomena** (a) Clonic movements, twitching or jerking in early minutes of induction, often start in upper eyelids. (b) Expression wild looking. (c) Swallowing, retching or vomiting, common. (d) Tetanic, spasm, marked rigidity—opisthotonus in some cases.
The Eye (a) Pupils large, contract to light actively. (b) Conjunctive sensitive. (c) Eyeballs roll. (d) Eyelids resist opening, winks when touched.	**The Eye** (a) Pupils small or medium fixed. (b) Conjunctive insensitive to touch. (c) Eyeballs fixed or slowly roll. (d) Lids often slightly open, relaxed, no winking.	**The Eye** (a) Pupils fixed, enlarge progressively and finally become irregular in shape. (b) Conjunctive insensitive. (c) Eyeballs fixed in some position or jerk. (d) Eyelids stiff. Often wide open.
Colour in Skin (a) Pink or no change normally. (b) In anæmics, no colour change. (c) In plethorics, slight cyanosis.	**Colour in Skin** (a) Varies from pink to decided cyanotic tint. (b) In anæmics, no colour change. (c) In plethorics, considerable cyanosis.	**Colour in Skin** (a) Usually cyanotic. (b) In anæmics, slight flushing, rarely cyanosis. (c) In plethorics, almost black.
Remedy Decrease the percentage of oxygen in the mixture.		**Remedy** Increase oxygen in the mixture or in (d) inflate lungs with pure oxygen 1 to 3 times.

of the operation, see that plenty of oxygen is available, and know by previous trial upon yourself that the apparatus will actually inflate the lungs with pure oxygen, then proceed to secondary saturation as follows:

A. Deoxygenation. Reduce the proportion of oxygen or administer 100 per cent. nitrous oxide until the pupils dilate (beware of glass eyes and adherent iris), tonic muscular spasm or rigidity develops, respiration becomes slow or stops. These are the signs of the profound plane of anæsthesia.

B. Reoxygenation. Then administer one breath of 75 to 100 per cent. oxygen, if the patient inhales, if he does not, partly fill the lungs by inflating with pure oxygen once or twice—usually once is sufficient. The cyanotic colour now begins to lighten, if present, the pupils retract, the pulse is normal or slower than before, the muscles become perfectly relaxed and respirations resume.

If care is taken not to administer too much oxygen or too many breaths of oxygen, which will in itself desaturate, the period of relaxation may last throughout the operation, or it may be necessary to resaturate if air leaks into the respiratory channels of the apparatus, and thus

displaces the nitrous oxide with an excess of nitrogen and oxygen.

There are good reasons for believing that air is slowly but sufficiently absorbed through the skin and open abdomen to destroy the nitrous oxide saturation, in some cases, necessitating resaturation at the time of closing the abdominal wound. At this time another advantage may be taken of the procedure to immobilize the abdomen for a few seconds while closing the peritoneum.

After reoxygenation of secondary saturation is begun there are from 5 to 20 seconds when the patient does not breathe because of the excess of oxygen in the blood and brain, and if this phase of secondary saturation is properly timed it not only gives the surgeon a perfectly flacid abdominal wall, but also a quiet peritoneum to sew.

Test for Patient's Capacity for Operation

We are occasionally asked to anæsthetize patients who may be regarded generally as inoperable. Without the operation death may be *inevitable* and with it, *probable*. If the patient is unable to withstand the burden of beginning narcosis, the operation ordinarily must be abandoned forthwith. But how may we more surely determine that the patient will succumb during or immediately after the operation? How can we avoid the hopeless cases, without abandoning any who might be cured? The answer to these questions is difficult and depends upon many factors beside the resistance of the patient:—Duration and character of operation; the surgeon, the anæsthetist, the anæsthetic, and the use of other agents calculated to prolong life. It is a delicate situation in which any one member in the team may cause disaster on the table; and in which the most intelligent co-operation of all may not avoid it.

You cannot tell by the looks of a frog how far he can jump, nor will mere inspection, however valuable, give more than a vague prognosis.

The pulse may not be extreme in rate and the blood pressure may be shamming. The real question is, how much reserve have we to draw upon, or will a slight interference break the delicate balance of pulse, blood pressure, and respiratory relations, and initiate an immediate demise?

Illustrative Case

Several years ago I was called into the country to anæsthetize a farmer who had had a strangulated hernia for several days, and was apparently very near death. After carrying him from the bed to the kitchen table he had to be resuscitated with oxygen. I did a primary saturation with gas-oxygen and was compelled to again resuscitate with oxygen, which was easily accomplished. The surgeon then suggested that we try ether on the supposition that ether is a stimulant even in anæsthetic dosage. A few drops were administered and after fifteen minutes work with oxygen the patient was sufficiently resuscitated to be put to bed without the operation. The patient died four hours later. We concluded that this patient was inoperable.

Blood Pressure Guides

When a normal pulse rate is reduced the blood pressures normally fall from 25 to 50 per cent. of the difference in pulse rate, and conversely when the pulse rate increases the blood pressures rise. A patient who has a pulse rate of 120 or over may develop a slower heart beat under anæsthesia with a slightly increased blood pressure or the pressures may remain stationary while the pulse becomes slower. Such a condition is of good omen and not an indication of circulatory depression. When changes in pulse rate are not accompanied by the above changes in blood pressure we have some degree of circulatory depression.

Primary and secondary saturation at one phase increases the pulse rate and immediately following decreases the pulse rate and blood pressures. When the oxygen reaches the blood stream a moment later the pulse and blood pressures return immediately to their former readings. This is the normal response to saturation and reoxygenation.

Now in the moribund case we usually have circulatory depression of a more or less serious degree to begin with, and the effects of primary saturation followed by a breath or two of oxygen may show an increased circulatory depression lasting for three to five minutes, which contraindicates any but extremely short and simple operative procedures.

In the class of cases under discussion, requiring an abdominal or other *major* operation, a deeper test is needed to determine the reserve or power of compensation which the patient must have to go through the procedure. For this, I have many times resorted to first primary and then secondary saturation, noting the effect on the pulse and blood pressure relations for

three to five minutes after the oxygen is administered. If the pulse is increased as much as 25 per cent. and the blood pressures decreased 25 per cent. or more (second degree depression) and the patient, while inhaling oxygen, is unable to compensate within five minutes, he may be regarded as absolutely inoperable for major surgery, in the hand of the best organization of anæsthetist, surgeon and assistants.

The personal factor enters in saying "yes" or "no" to a proposed operation. Patients are being shocked to death every day who would easily pass the above test. The anæsthetist must properly rate himself as well as the surgeon, assistants and patient, denying none who might live if operated and refusing all who will die while being operated.

I have had no deaths or serious scares as a result of either primary or secondary saturation.

Conclusions

1. Primary saturation of the patient with nitrous oxide fails in some cases to produce sufficient relaxation for certain operations.

2. Nitrous oxide produces muscular relaxation when it is sufficiently concentrated in the tissues and associated with enough oxygen to prevent anoxæmic rigidity. High concentration of this gas in the tissues is required to displace the non-anæsthetic diluting gases.

3. The technic of secondary saturation which I have described and used extensively for several years, intensifies nitrous oxide anæsthesia and produces sufficient relaxation for any operation.

4. Secondary saturation is readily lost by subsequent errors in the mixture administered, leaks of air into the patient's air passages and probably by absorption of air through the abdominal cavity and skin, requiring occasional resaturation in some cases.

5. Its successful and safe employment depends upon an apparatus capable of inflating the lungs with oxygen should the patient be crowded, intentionally or accidentally, into spastic apnœa. It depends also upon an accurate interpretation of the signs of anæsthesia, but disregarding the the presence of absence of cyanosis as an anæsthetic sign.

6. Secondary saturation has been followed by no post-anæsthetic sequelæ which may be attributed to its use. I believe it is safer for the patient than an ether sequence, or combined gas-oxygen-ether, and convalesence is decidedly better, when even the small amount of ether, which is employed to relax muscles, is avoided in the narcosis.

7. Primary and secondary saturation, in their relation to the pulse, and blood pressure ratios, make a valuable and safe test if operability in doubtful and moribund cases.

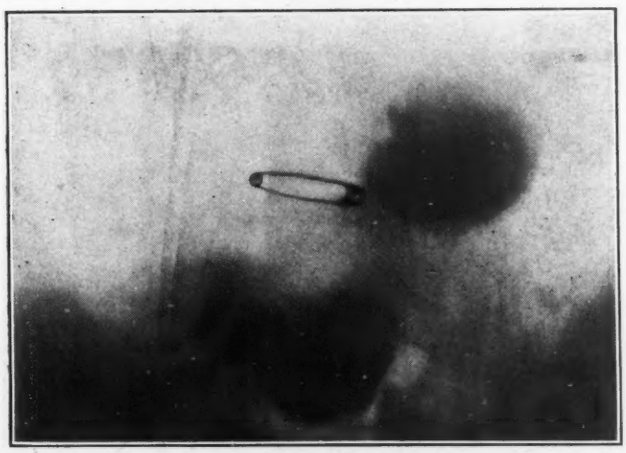
Case Report

AN UNUSUAL ABDOMINAL CONDITION COMPLICATING HOUR-GLASS STOMACH

W. A. Lincoln, M.D., F.A.C.S., F.R.C.S. (Eng.)

Calgary

Personal and Family History. Patient No. 2076, Mrs. N., age forty-six, married, six children. No special difficulty; apart from her stomach trouble, has had no severe illness.



Two Hours After Bismuth Meal Showing Both Pouches

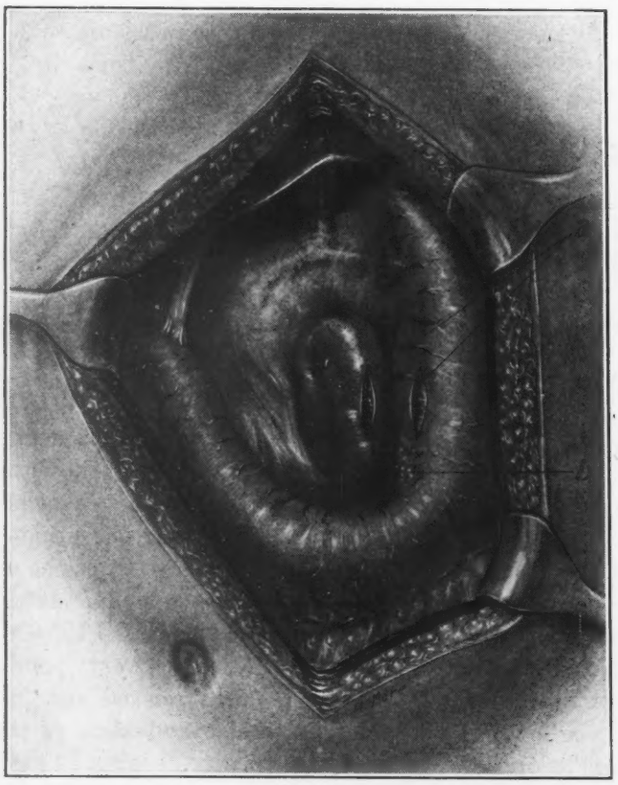
History of Present Illness. Ever since a girl she has had "stomach trouble" and was then told that she had a gastric ulcer. This was characterized by attacks of pain and discomfort coming on about two hours after taking food and relieved by her next meal. She was quite free from pain between the attacks, which at first came at rather long intervals. Latterly the trouble was more continuous and commenced very soon after taking food and was only relieved by vomiting. Vomiting has only been present during the last six months and is often of large amounts and contains food taken some time previously. She has never vomited blood or passed blood, by the bowels. Meat or solid food causes much more distress, and she now practically lives on milk or other easily assimilated food. She has lost twenty pounds in weight during the last two months. Gastric analysis shows an increased amount of contents, with a total acidity of sixteen and no hydrochloric acid. *X*-ray shows an hour-glass condition of the stomach with two pouches a considerable distance apart. The lower one situated in the pelvis. The first pouch takes three hours to empty and the lower one, eight to ten hours. Blood examination: leucocytes 8,600; red blood cells,4,125,000; hæmoglobin, 80. Patient is a small, very poorly nourished woman. Abdomen much relaxed and full in the lower quadrants. Physical examination of the various organs reveals no abnormality.

Operation. On opening the abdomen with the

Appearance on Opening the Abdomen

(*a*) Liver, (*b*) Pancreas. (*c*) Stomach, (*d*) Ileum, (*e*) Root of Messentery, (*f*) Jejunum.

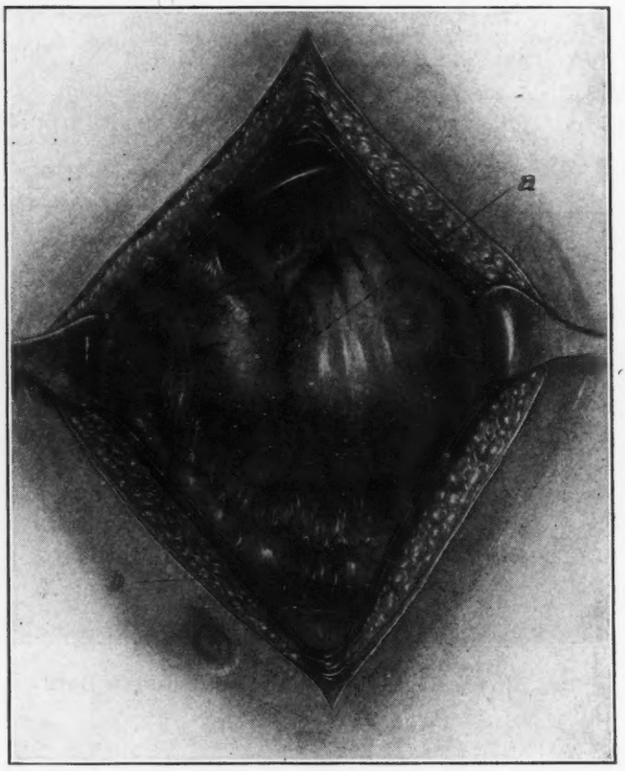
Read at the fifty-first annual meeting of The Canadian Medical Association, Vancouver, June 24th, 1920.



APPEARANCE WHEN BOWELS ARE REPLACED AND PREPARED FOR GASTRO-ENTEROSTOMY

(*a*) Incision in Jejunum and Stomach for Gastro-enterostomy.
(*b*) Healed Ulcer of Stomach.

ordinary high incision, no stomach, transverse colon, or omentum were seen. The pancreas, root of jejunum and small bowel presented. Examination revealed the fact that the stomach and transverse colon had dropped, and the whole small bowel had herniated through the transverse meso-colon into the lesser sac and again through the gastro-hepatic omentum, so that the stomach and transverse colon were pushed down into the pelvis and to the back, the small intestines filling the central and upper portions of the abdomen. These were replaced and an anastomosis made between the proximal pouch of the stomach and the first part of the jejunum near its origin. The opening in the transverse meso-colon was closed and the distal pouch of the stomach attached to the proximal pouch thus obliterating the opening and preventing any possibility of a recurrence. Patient made an uneventful recovery and has since gained twenty-five or thirty pounds in weight. She is able to take a full and varied diet with no discomfort or symptoms referable to the stomach.



APPEARANCE WHEN OPERATION IS COMPLETED

(*a*) Two parts of Stomach Sutured Covering Opening in Transverse Mesocolon.
(*b*) Transverse Colon.

THE fifteenth semi-annual meeting of the Canadian Association of Clinical Surgeons was held in Montreal on January 8th, 1921. Dr. J. A. Hutchison presided.

In the morning the members met at the Royal Victoria Hospital where an interesting series of cases
were presented by the members of the hospital staff.

In the afternoon the meeting was held at the Montreal General Hospital where pathological specimens and living cases were shown. Many of these specimens and cases were of the greatest interest. Special mention could be made of Dr. Rabinovitch's demonstration of the prognostic value of the study of the blood chemistry of the acute abdomen.

In the evening the Montreal members entertained the visiting members at dinner during which the business meeting was held.

Doctor George Bingham of Toronto was unanimously elected President for the next meeting which will take place in Toronto in May.

Editorial

THE DEVELOPMENT OF NEUROLOGICAL SURGERY

IT is perhaps not too much to say that neurological surgery during the past twenty years has contributed to the advance of our ability to diagnose lesions of the central nervous system more than the pathological post-mortem work of many years previous was able to accomplish. The internist, while mildly sceptical, or even good-humouredly vituperative, in his remarks concerning the therapeutical results of the surgeon, has been glad enough to see with his eye what might be actually present in a given case, and to accept the information as a future guide. The results of surgical treatment as to cure in case of brain and cord tumours, epilepsy, severe cerebral injuries, and other lesions carrying a *prognosis infausta*, were at first thoroughly discouraging, and still remain somewhat depressing; but it can be said on the other side that improvement in this respect has in the last ten years been enormous. To take merely one instance; the removal of the Gasserian ganglion for that most agonizing of all maladies, tic douloureux, carried with it at first a mortality of 20 to 30 per cent. Through the work of Harvey Cushing and of Frazier, that has now been so reduced that the operation has become little more dangerous than a simple appendicitis, and less dangerous than that of a perforated appendix. Cushing has at present a series of over three hundred "gasserectomies" without a death.

Where cure is impossible, on the other hand, surgery is frequently able to afford great relief to headache and to save sight.

There was held recently in Boston the second meeting of the Society of Neurological Surgeons, numbering some twenty members. The work shown and the discussion of live subjects in this domain, abundantly proved the necessity for the formation of an Association of such specialized workers. It is only by open discussion between experts, meaning men possessed of unusual experience, that progress along new lines can be most rapidly developed. And the tendency to specialize in this branch of surgery, as evidenced by the quite considerable number of members, was to the unprejudiced observer thoroughly justified by the scientific character of the contributions. The new work of Dandy upon the causes of hydrocephalus and upon the graphic demonstration of the cerebral ventricules in *x*-ray pictures by the injection of air was reviewed. It was pointed out that the method was not without some danger, unless very carefully carried out by an expert. Even then it was occasionally followed by symptoms of cerebral compression severe enough to cause anxiety, and even alarm.

The question of intravenous injection of saturated salt solution with the object of reducing the amount of fluid in the ventricles in cases of hydrocephalus with headache was reported on; and the experience of certain of the members was to the effect that in the majority of

instances there could be obtained by this method the withdrawal of a considerable amount of ventricular fluid into the blood, presumably by osmosis, with resulting relief of pressure symptoms; but that the effect was usually transitory. Experimental work was being done in the matter by Sachs, of St. Louis, who made a short preliminary communication.

There is no need in this place to review the work of the meeting in detail. But it seemed to the writer that the establishment of a society of this nature, marking, as it did, the growth of interest and of success in a branch of surgical work to which only a few years ago not more than two or three men in the world were devoting all their time, and which was generally considered a nearly hopeless field, was worthy not only of comment but also of sympathetic encouragement.

THE ACUTE ABDOMEN

IN this issue of the Journal there appear a number of papers concerned with various aspects of what is nowadays called the "acute abdomen". Those who aspire to a decent style in writing, but who cannot find the necessary time, always put this phrase in quotation marks, by way of notifying the reader that they disclaim all responsibility for it, and to indicate, in fact, that they consider it an ellipse to be deprecated. Yet they are forced to use it, because it is convenient, and very expressive.

There is nothing particularly new in these papers, but they are none the less useful, in that they bring forcibly to the attention of the general practitioner the necessity of giving very serious consideration to each case that presents acute symptoms in the abdominal region. A good deal has been written in the last few years on this subject, particularly by Deaver, of Philadelphia. And this is well, because we learn by iteration. The lesson must be conned o'er and o'er. And, in the present matter particularly, the medical man cannot be too often reminded of the necessity of accurate diagnosis and early treatment. It is by much writing of this sort in many medical journals throughout the country during the last thirty years that cases of appendiceal abscess and of general peritonitis are now becoming in hospital practice so much less frequent than they were years ago. Yet is there room for improvement. There still appear in our hospitals too great a number of patients sent in by the general practitioner at so late a stage that the patient's chance of life, and his physician's reputation, are equally endangered. We hope that the series of practical articles which we publish this month will inspire in the minds of the profession throughout Canada a proper fear of the "acute abdomen" and a greater promptitude in the calling of a competent surgeon in consultation.

It is true that in the present day one expects from the general practitioner, who is driven to death in looking after the minor illnesses of life, a wider range of reading and a more extensive knowledge of disease than it is possible for him either to do or to acquire. But this

subject at least is so important, and carries with it such grave responsibility for the life of his patient, that he ought to consider it his duty to devote time to its study. It ranks in seriousness to take merely one instance, with the graver complications of midwifery. This simile will doubtless carry its proper appeal.

NEWER IDEAS IN THE TREATMENT OF DIABETES MELLITUS

IN a recent issue Newburgh and Marsh bring before the profession the general principles underlying the treatment of diabetes mellitus. It is generally admitted by those who have had an extensive experience with the treatment of this disease by Allen's methods that there are a certain number of severe cases, especially in children, where the procedure has been a failure. This has been largely due to their inability to build up a mixed tolerance high enough to maintain a nitrogen equilibrium, and at the same time to control the hyperglycemia; the result has been that the individuals progress to a fatal termination by slow starvation. Recently Allen has laid great stress upon the importance of a restricted fat intake which in many cases has necessitated insufficient calories. Again through his experimental work he attempts to show "a quantitative relation between the internal pancreatic function and the total body weight and metabolism."

Newburgh and Marsh, through a study of seventy-three cases of diabetes mellitus, have come to the conclusion that many severe cases can be returned to a useful and productive life by the use of a high fat, low protein, low carbohydrate diet. The protein element is correctly based upon Hindhede's observation that less than 0·66 grams of protein per kilogram of body weight will maintain nitrogen equilibrium provided enough calories are supplied from other sources. Their published facts show that the glycosuria is controlled in severe cases, that the hyperglycemia is lowered, that an acidosis is not precipitated, and when present rapidly clears up, and that the nitrogen equilibrium can be maintained. It is an important observation that an acidosis of moderate grade will disappear when the body is called upon to burn as high as four to five molecules of fat for each molecule of carbohydrate. Also the fact that these high fat diets react favourably upon a hyperglycemia is worthy of consideration. It would be instructive to know more about the total blood fat and its partition in such diets, as this subject was not touched upon in their work. The ultimate outcome of a high fat, low protein, low carbohydrate regime for diabetic patients time only will tell, but the favourable state of health of the reported severe cases several months after discharge is striking.

The Association

REPORT OF EDUCATION COMMITTEE AT THE VANCOUVER MEETING.

JUNE 1920

THE following resolutions were referred to the Committe on Medical Education at the Quebec Meeting:

1. "That the Committee on Medical Education be instructed to investigate the possibility of providing University Extension Post-Graduate Courses for members of the profession in various local societies, and to report on the question at the next meeting of the Association."

2. "That the Canadian Medical Association recommend that medical men who at the outbreak of the war were registered practitioners in any province of the Dominion and who gave up their practice in order to join the C.E.F. or other branches of the Imperial or Allied Armies; also all graduates of our Medical Schools in Canada, of the year 1914 to 1918 inclusive, who served in the O.M.F.C., or in the British Army or Navy, or Allied Forces, shall be elegible for registration in the register of the Dominion Medical Council without examination, provided always that the record of such service has been satisfactory."

Resolutions

Your committee is pleased to report that practically all the universities have agreed to co-operate in arranging port-graduate courses.

Your committee is of the opinion that lectures to County Societies by university men or others are of little enduring value. The call at the present time is for clinical work, and your committee recommends that the universities be asked to provide annually, short intensive courses, specially arranged to meet the needs of the general practitioner. Your committee would further recommend that the larger sanatoria in the Dominion be encouraged to establish clinics for the study of tuberculosis.

In regard to the second resolution your committee, while in entire sympathy with the wishes expressed, is unable to make any recommendation since it has been advised by the solicitor of the Medical Council of Canada, through its chief executive officer, that the said Council has no power to grant standing in any other way than by the regular examinations.

Census

There are 11,202 practitioners registered in Canada. Of this number approximately one thousand are not in active practice. There are 250 women doctors. The following table shows the census according to the latest available figures.

Province	*Practitioners*	*Population*
British Columbia	790	450,000
Alberta	600	500,000
Saskatchewan	463	492,432
Manitoba	519	553,860
*Ontario	5,743	2,523,274
Quebec	2,000	2,003,232
Nova Scotia	751	826,100
Prince Edward Island	77	83,728
New Brunswick	259	351,859

It would appear that Ontario with its relatively large urban population is over stocked.

The Six Year Medical Course

So far as your committee has been able to learn, only a small percentage, no more than 10 to 15 per cent. of the Canadian profession supports the six year academic course, as at present adopted by the majority of the universities of Canada.

Criticisms and Suggestions

1. The universities acted with unseemly haste in adopting the six year course without giving the five year course a fair and adequate trial.

2. A higher standard of entrance, a course of reasonable length, say five years, and greater facility for post-graduate work would have yield-

*Of the 5743 practitioners on the Ontario Register, only 3460 are in actual practice.

ed better results for the Canadian people than the straight six year academic course.

3. Too much stress is being laid, in some of our universities, on the importance of laboratory work. Instrumental methods are of value, but very rarely should a diagnosis rest on instrumental methods alone. Mechanical devices of proven worth should be employed but always as a means of training the senses, never as a substitute for them. The heart and arteries may give more information as to the nature and extent of a kidney affection than the most elaborate chemical and microscopic examinations; the latter should never be neglected, but let them be assigned their proper place.

Danger Signals

1. There is a danger of too much centralization of authority, and of too much reverence for the fetish of standardization by laymen and others, who however interested, are not really in vital touch with the practical side of medical education in this country.

2. Certain organizations are proclaiming loudly that the medical profession is a close corporation, and that there is now no hope for any but the sons and daughters of the rich to qualify. Is there any justification for this charge?

3. It appears inimical to the highest interests and future welfare of our country, that any foreign organization, with unlimited means at its disposal, should be permitted, without government or other supervision, to inspect our institutions, standardize, in accordance with a foreign standard, our medical courses, and otherwise influence the life and policy of our universities.

Surely we require a more intense national spirit, a greater measure of self-respect, and an unswerving determination that, come what will, the plants that are allowed to take root in this country, must conform to Canadian ideals and must be permitted to develop undisturbed, for the benefit of the Canadian people.

All of which is respectfully submitted,

(Sgd.) JAS. THIRD,
Chairman

Kingston, Ont.

June, 14th 1920.

Correspondence

DICTIONARY OF ALTITUDES IN CANADA

To the Editor:

It may not be generally known among your readers that the Commission of Conservation has a publication, *Dictionary of Altitudes in Canada*, a cloth-bound volume, which may be obtained by medical men free upon request.

With the movement of population from one portion of Canada to another, it is of importance that medical practitioners be in a position to advise as to the possible effect upon the health of patients of change of residence to new localities, especially of higher altitude.

Recording, as it does, the altitude of all places of importance in Canada, the Dictionary of Altitudes should be valuable as a reference volume to medical men.

If you would kindly transmit this information to your readers, it would be appreciated.

Yours faithfully,

JAMES WHITE
Deputy Head

Ottawa,

December 24th, 1920

Retrospect

THE ÆTIOLOGY AND PROPHYLAXIS OF SIMPLE GOITRE

S. Graham Ross, M.D., M.R.C.P.

Montreal

THE problem of simple goitre has received much attention of late. There is a growing recognition of the fact that endemic goitre, the most important type, is a problem of public health and of child welfare. The latter standpoint is reasonable when one considers the three periods at which goitre most frequently develops (a) intra-uterine life (resulting in congenital goitre), (b) puberty, (c) pregnancy. The second of these is the most important. Cretinism and cretinoid conditions bear also the closest relation to endemic goitre.

Ætiology. The ætiology of the disease remains unsettled. Many support the theory of infection. McCarrison[1] in India arrived at the conclusion that the causal agent or agents were facultative anærobic organisms, probably bacteria, growing in the intestinal tract. They produced toxins which, after absorption, acted on the thyroid gland causing goitre. From experiments on rats[2] he concluded that (a) approximately 63 per cent. of the offspring of goitrous parents (rats) were born with congenital goitre, (b) congenital goitre was due to the action on the fœtal thyroid of toxic substances derived from the maternal intestine. By experiments on goats[3] he found that by the feeding of cultures of micro-organisms grown from the fæces of goitrous individuals, the goats all developed goitre within six months. In a review of the subject[1] he claimed that during the pregnancy of a goitrous mother the toxin was carried to the fœtus, and might cause congenital goitre or varying degrees of cretinism in the offspring. He found that the mother of cretins in goitrous localities were almost invariably goitrous while of the cretins themselves 50 per cent. had goitre. He laid stress on the importance of a careful consideration of the ante-natal history in order to facilitate the early recognition of cases of congenital hypothyroidism. Otherwise these were rarely recognized until the end of lactation. It was his opinion that a degree of immunity was developed in endemic areas so that visible goitres were comparatively rare in indigenous children under eight years. The most susceptible age appeared to be nine years in a boy and ten in a girl. McCarrison's work cannot be accepted as conclusive for several reasons. In the first place the specific micro-organism causing the disease has not been isolated; secondly, work of other experimenters has failed to confirm his results.

Hirshfield and Klinger[4] through experimental work on endemic goitre arrived at almost opposite conclusions to those of McCarrison. Working with rats they found that the administration of water from different goitrous localities gave inconstant results. They concluded that water from a goitrous area was not the ætiological factor. Feeding experiments with the intestinal contents of goitrous rats were also unconvincing, and made the probability of a goitre-producing parasite unlikely. They also decided the the lack of iodine in the diet was unlikely to be the cause of goitre. In their opinion goitre was not a chemical intoxication or infectious in nature, but rather due to a change in metabolism especially of protein. The authors do not enlighten us as to the nature of this metabolic disturbance. But there are observations which, in the minds of some authors, seem to point at times to an infectious origin of goitre. These are the apparent epidemic outbreaks of goitre which have been reported from time to time, and when other causal factors can be excluded, they give support to the theory of infection. During the war several of these were noticed in Austria-Hungary. Cemach[5] reported a series of fifty-three cases seen during 1915-1916 in one Vienna clinic. The subject's were all destitute, poverty-stricken refugees from Galicia. The writer heard of many other similar cases in the city. These refugees did not come from a goitrous district nor was goitre endemic in Vienna. This suggested to the author the possibility of an epidemic outbreak.

A great increase in the incidence of goitre in children was noticed in Budapest during the last year of the war. Vas[6] reported that among the

twenty to thirty thousand cases seen yearly at one hospital the incidence of goitre varies from 0·03 per cent. to 0·21 per cent. In the first seven months of 1918, there were 188 cases of goitre among fourteen thousand cases or 0·83 per cent. A corresponding increase was noticed in adults. The cases arose in several fairly well localized areas throughout the city. Apparent house infection was also noticed. After discussing the ætiology the author concluded that the causal agent was probably water-borne and likely of an infectious nature.

Reporting the growing frequency of goitre in a locality in the west of England, H. J. Boyd[7] found the only factor bearing on the ætiology had been a change in the water supply from shallow to deep wells. Barherd[8] in Switzerland claimed that goitre was more prevalent in places poor in sunlight, e.g., deep mountain valleys. He suggested the hypothesis that sunlight by its sterilizing effect upon the drinking water might be a prophylaxis against the incidence of goitre.

Marine in the United States[9] summed up his experimental work on the production of goitre in dogs as follows:

(a) Developmental stage of all goitres is characterized by increased blood-flow, increase in the size and number of epithelial cells, decrease in the stainable colloid of follicular spaces, marked absolute decrease in the iodine content. Decrease in the iodine content precedes cellular changes.

(b) Similar thyroid changes (compensatory hyperplasia) invariably occur in remaining portion of gland when sufficient portion is removed.

(c) Administration of exceedingly small amounts of any salt of iodine protects against the compensatory hyperplasia.

(d) If most of the thyroid gland is removed before or in the early stages of pregnancy, the pups at birth will have enlarged thyroids.

(e) Thyroid gland has an extraordinary affinity for iodine shown experimentally.

This data strongly suggests the possibility of goitre being a deficiency disease due to a lack of iodine supply to the body whether carried in the food or water.

Prophylaxis and Treatment. It is well recognized that prophylaxis against goitre is easier than its cure. As pointed out above, the two danger periods are (a) that leading up to puberty, (b) pregnancy. Prophylaxis in the second instance will protect not only the mother, but her child. Our two most valuable remedies are iodine and thyroid extract. The isolation by Kendall in 1914 of the alpha-iodine compound from the thyroid gland—a substance containing 60 per cent. of iodine and apparently the active principle of the gland, has helped to place iodine therapy on a rational basis. Not infrequently cases have been reported where a woman with goitre has borne children with congenital goitre and at the next pregnancy by the prophylactic use of thyroid extract the infant has been born healthy. Might not the same be accomplished by the use of iodine?

Workers with the most diverse views as to the ætiology of goitre bear witness generally to the value of iodine therapy. Grumme[10] advocated this treatment in Switzerland and mentioned the work of Frey who treated uncomplicated goitre with monthly courses of iodine, and claimed good results without harmful secondary effects. He mentioned Oswald's opposition to iodine therapy based particularly on the danger of thyro-toxic symptoms. The writer considered the danger overrated. The risks, just as in the treatment of syphilis with salvarsan, were justified in view of the great benefits obtained. He pointed out that the endemicity of goitre corresponded closely to the lack of iodine in the food, and in connection with the comparative freedom of maritime districts from goitre he had demonstrated that the thyroid glands of dwellers in Hamburg contained, proportionally to weight, two to three times as much iodine as dwellers in Freiburg where goitre was endemic.

McCarrison[1] also claimed iodine to be the most potent of all remedies. He recommended rather large doses,—Tinct. Iodi. MV combined with Pot. Iod. gr. V,—as an initial dose; this to be gradually increased to four times that amount. The boiling of drinking water, correct hygienic conditions, and intestinal antiseptics were other measures advised. He claimed that the above treatment would cure the majority of cases.

It has remained for Marine[9] and his co-workers in the United States to undertake the prevention and treatment of goitre on a large scale. Following successful experimental work on animals and fish, they attempted the prevention and control of the disease in children in one of the endemic areas of the Great Lakes basin. It was arranged to administer prophylactic treatment to pupils of the public schools of Akron, Ohio. Girls were selected on account of the greater frequency of the disease in their sex. The ages ranged from ten to eighteen. To such as selected treatment

sodium iodide in doses of 2 gms. to the younger and 4 gms. to the elder pupils, was administered in a period extending over two weeks. This amount was to be repeated every six months. Previous to treatment 3872 girls were examined. In 43·6 per cent. of these the thyroid was normal, in 49·9 per cent. slightly enlarged, and in 6·3 per cent. moderately enlarged. Six months later the authors re-examined the cases and gave the results of treatment from May, 1917, to November, 1917[11]. Of the 764 who had volunteered for treatment not a single girl with a normal thyroid at onset had enlargement, while the goitre had disappeared from 33·5 per cent. of those who had had slight enlargement. Of the 1879 who had not taken treatment, goitre had appeared in 26 per cent., while the goitre had disappeared from only 1·2 per cent. of those with slight enlargement. The moderate goitres showed a similar tendency to disappear under treatment.

These encouraging results were confirmed by the results of continued treatment up to November, 1918[12] and in their fourth paper[13] they summarized the results of treatment over a period of thirty months up to October, 1919. During this time 2190 took treatment, whereas 2305 did not officially undergo the same (although the authors have reason to believe that many of these underwent treatment at home).

Prevention. Of those who were normal at the first examination and did not take iodine, 347 or 27·6 per cent. had enlarged thyroids, while of those who were normal at the first examination and took iodine 2 or 0·2 per cent. had enlarged thyroids. Of those classified as having slightly enlarged thyroids at the first examination who did not take treatment, 127 or 13·3 per cent. had a further increase in the size of the thyroid, while of those taking the treatment 3 or 0·3 per cent. had a further increase. Corresponding results were seen in the moderately enlarged thyroids.

Curative or therapeutic effect. Of patients whose thyroids were slightly enlarged at the first examination and who took iodine, 659 or 57·8 per cent. of the glands underwent a decrease in size, while of those not taking treatment only 134 or 13·9 per cent. of the glands became smaller. The same tendency was observed in the case of moderate enlargements.

The authors concluded that (a) goitre is an easily preventable disease, (b) its prevention in adolescence should be a public health problem, (c) there is practically no danger of untoward secondary effects such as iodism or hyperthyroidism.

Bernhard[8] mentioned Kocher's suggestion for the use of minimal amounts of iodine as a prophylactic in the schools. Special wells treated with iodine might be established at each school. Judging from the numerous references in their literature the Swiss medical profession is recognizing the necessity of facing the problem. Klinger[14] in a communication in 1918 expressed the hope that a rational prophylaxis of endemic goitre would soon be organized. Although the ætiology was still doubtful the search for a prophylactic agent must not be put off on that account. He proposed the systematic giving of iodine especially to children in the goitrous areas; 2-4 mgs. daily making 1-1.5 gms. yearly was the dose suggested. The experiment should be continued for a number of years. In the following year the same writer[15] lamented the fact that no prophylactic organization had yet been started. He reviewed the work of Marine in the United States and considered that it might well be copied on a large scale in Switzerland.

References:

1. McCarrison.—Endemic Goitre, *Practitioner*, 1915, xciv, 70.

2. McCarrison.—Experimental Researches on Ætiology of Endemic Cretinism, Congenital Goitre, etc., *Indian J. M. Research*, 1913-14, l, 505.

3. McCarrison.—The Experimental Production of Endemic Goitre, *Indian J. M. Research*, 1916-17, iv, 183.

4. Hirshfeld and Klinger.—Experimentelle Untersuchungen über den Endemischen Kropf, *Arch. f. Hyg.*, 1916, lxxxv, 139.

5. Cemach.—Zur Epidemiologie des Kropfes, *Wien Klin. Wchnschr.*, 1917, xxx, 813.

6. Vas.—Ueber eine Vorwiegend im Kindesalter Beobachtete Epidemische Verbreitung des Kropfes in der Haupstadt Budapest, etc., *Jahr. f. Kinderheilk*, 1919, xc, 243.

7. Boyd.—An Address on Goitre, *Brit. Med. Jour.*, 1919, ii, 169.

8. Bernhard.—Kurze Mitteilungen zur Aetiologié und Prophylaxis des Kropfes, *Cor.-Bl. f. Schweiz Aerzte*, 1918, xlviii, 65.

9. Marine and Kimball.—The Prevention of Simple Goitre in Man, etc., *J. Lab. & Clin. M.*, 1917-18, iii, 40.

10. Grumme.—Zur Joddarreichung bei Kropf., *Cor.-Bl. f. Schweiz. Aerzte*, 1916, xlvi, 494.

11. Kimball and Marine.—The Prevention of Simple Goitre in Man., *Arch. Int. Med.*, 1918, xxii, 41.

12. Kimball, Rogoff and Marine.—The Prevention of Simple Goitre in Man, *J. Am. M. Ass.*, 1919, lxxiii, 1873.

13. Marine and Kimball.—The Prevention of Simple Goitre in Man, *Arch. Int. Med.*, 1920, xxv, 661.

14. Klinger.—Zur Prophylaxe des Endemischen Kropfes, *Cor.-Bl. f. Schweiz, Aerzte*, 1918, xlviii, 546.

15. Klinger.—Neue Vorschläge zur Prophylaxe des Endemischen Kropfes, *Cor.-Bl. f. Schweiz, Aerzte*, 1919, xlix, 575.

Abstracts from Current Literature

SURGERY

Penetrating Wounds of the Chest. HEUER, PRATT AND MASON: *Annals of Surgery*, 1920. Vol. LXXII, p. 352.

AFTER a short discussion of opinions held regarding indications for operative interference in cases of war wounds of the chest prior to March, 1917, the authors outline and give their reasons for the routine adopted at Evacuation Hospital No. 1. Through and through bullet wounds without open pneumothorax or extensive rib fractures, and penetrating bullet wounds and small shell wounds were treated expectantly. Operation was performed as soon as possible on (a) wounds with sucking pneumothorax, at the time of operation removing foreign bodies, controlling hæmorrhage, and suturing or resecting the lung when indicated; (b) those with an acute continuous hæmorrhage threatening life; (c) those with large intrapleural or intrapulmonary foreign bodies; (d) those with extensive rib fractures.

Normal uncomplicated cases showed febrile reactions from 100°-103° or 104°. Most frequently the temperature began to decline on the third to the fifth day, but showed a daily run to 99° or 101° for from ten days to two weeks.

The various complications such as infected hæmothorax, pneumothorax, pneumonia celulitis, and gangrene, are discussed.

Aspiration was performed in all cases of large hæmothorax both for diagnosis and as a therapeutic measure. Either smaller quantities 200 to 500 c.c. were removed daily from the fourth day, or aspiration was postponed to the 10th or 12th day, when all the blood that could be obtained was removed. All cases which had suffered from a large hæmothorax showed one month after injury adhesions obliterating the costo-diaphragmatic angle and to practically the same extent, whether they had been aspirated or not.

F. B. G.

Subluxation of the Head of the Radius. GROSSMAN, JACOB: *Medical Record*, December, 1920, Vol. XCVIII, p. 981.

BASED on the study of thirty-seven cases of this injury of which illustrative cases are recorded, the author comes to the following conclusions:—

1. Subluxation of the head of the radius is a fairly common condition and is often overlooked It is often diagnosed as sprain of the shoulder or wrist or fracture of the forearm.

2. It occurs only in children, generally between the ages of eight months and three years.

3. The mode of production and the subsequent picture, namely raising or dragging the patient by gripping the wrists, and the apparent flaccid paralysis, are characteristic of this condition.

4. It is often called "traumatic palsy" of the upper extremity, inasmuch as the child allows the arm to hang limp and refuses to move it on account of the pain.

5. Extreme forcible supination is all the treatment required to overcome the subluxation. Reduction is accompanied by a distinct click. After care is not necessary.

6. As relapses may occur parents whould be warned of the risk of dragging or lifting thier children by gripping the wrists. F. J. T.

Recent Consideration in the Management of Fractures. MOORE, C. HOWARD AND SMITH, ALAN DE F. *The Military Surgeon*, December, 1920, Vol. XLVII, P. 666.

A SERIES of 1,400 fractures arising in the United States Third Army following the armistice in November, 1918, conforming to the types met with in civil practice, furnished the authors with the opportunity of demonstrating the applicability of methods largely developed during the war to cases seen in civil life. Among the various causes cited athletics were responsible for 22·8 per cent., motor vehicles 21·2 per cent., and falls 17·8 per cent. Injuries from firearms formed but 3 per cent. of the total. From their results they add emphasis to the conclusions of Sir Robert Jones, Sir Anthony Bowlby and others, that the fullest co-operation and success in the treatment of fractures can be obtained in peace as in war by the concentration of cases.

The paper urges the importance of the following points:—

1. That the treatment of fractures by a com-

bination of traction and suspension is of the greatest usefulness in cases of the civil type and is the method of choice in the great majority of fractures of the shaft of long bones.

2. The earliest possible reduction or other definitive treatment of a fracture is imperative, regardless of the amount of swelling or any other condition, except shock.

3. That in any community where fractures occur in large numbers they can be treated most satisfactorily in special fracture services.

4. A standard equipment consisting of a few simple splints such as the army patterns lead to the most satisfactory results in the treatment of fractures received in civil life as well as in war.

5. Well equipped departments of hydro and electro-therapy, physiotherapy and occupational therapy are necessary auxiliaries of a fracture service.

6. The fullest co-operation between the surgeon and the radiologist is essential. A portable bedside *x*-ray equipment is necessary for the treatment of fractures by the suspension and traction method. F. J. T.

Studies in the Effects of Nitrous Oxide-Oxygen Anæsthesia on Experimental Tubercle Bacillus Infections. ROGERS, J. B.: A paper read before the Interstate Association of Anæsthetists, Pittsburg, Oct. 6th, 1920.

DUE to the great prevalence of pulmonary tuberculosis an anæsthetic that can be used for operative procedures on tuberculous individuals, without producing injuries to them, is greatly needed. Only during the last few years has it been fully recognized that a rapid spread of the disease often followed operations on the tuberculous under ether anæsthesia, and for this reason clinicians treating cases of tuberculosis generally advised against surgery except under extreme circumstances. From the work of Corper, Brown and Petroff, Zueblin and Rogers, it can be seen that repeated ether anæsthesia on tuberculously infected animals does not result in more rapid spread of the disease process. From the work of Dunham it seems established that the spread of chronic tuberculosis through the lungs, with fatal termination of the disease, comes largely as a result of aspiration from the apical lesion causing aspiration bronchopneumonia and after a few months, death. Presumably ether anæsthesia by causing laboured respiration and increased mucous secretion determines the incidence of aspiration bronchopneumonia. To determine the relative inocuousness of nitrous oxide-oxygen anæsthesia in the presence of tuberculosis several series of experiments were made on guinea pigs to determine whether or not the administration of these gases would hasten or retard the development of the tubercle or otherwise influence the general health of the tuberculously infected animals. All animals were first sensitized with an avirulent culture of human tubercle bacilli and then were infected through the respiration route. Beginning twenty-four hours after infection the animals were given nitrous oxide-oxygen anæsthesia for fifteen minutes on nine successive days. Control animals were left unmolested. Twenty guinea pigs, suffering with pulmonary tuberculosis, were given repeated nitrous oxide-oxygen anæsthesia. In series 1, eight of the thirteen controls died from pneumonia before the experiment was completed, while only three of the thirteen anæsthetized pigs died during the experiment. Of the four controls which died after fourteen days, all showed tuberculosis of lungs, liver, spleen and bronchial glands. When the ten anæsthetized and four remaining controls were dissected thirty days after infection, no difference could be noted in the anatomic distribution or extent of tuberculous involvement. In series 2, the disease was permitted to develop fourteen days and the animals were then anæsthetized with nitrous oxide-oxygen each day for fourteen days. Immediately following the last anæsthesia both the experimental and control animals were killed and sectioned but no difference in the amount of tuberculous involvement in the anæsthetized and control animals was found. Hence the following conclusions may be drawn: (1) Nitrous oxide-oxygen anæsthesia, administered daily to guinea pigs suffering from pulmonary tuberculosis, does not influence the development of the disease, neither is it detrimental to the general health of the animal: and (2) since these gases do not cause as much labor in respiration and are less irritating than ether, they can be considered more suitable for anæsthesia, when used in cases of pulmonary tuberculosis and other respiratory diseases.

W. B.

MEDICINE

Studies on the Acetone Concentration in the Blood, Urine and Alveolar Air (papers 2 and 3). WIDMARK, E. M. P.: *The Biochem. Jour.*, July, 1920, Vol. XIV.

WIDMARK proves by experimental work that acetone diffuses readily through all the tissues of the body. The wall of the urinary bladder is no exception. Therefore the concentration of acetone in the urine is practically always the same as that in the blood. No concentrating action of this body can be brought about by the kidney. Aceto-acetic acid is present in the blood mainly as a dissociated salt, therefore exerting only a limited action in penetrating animal membranes. Passing through the kidney it is concentrated, enabling it to be present in the urine in a greater concentration than in the blood.

The author disproves the theory that any secretory activity is exerted by the lungs during the passage of acetone from the blood into the alveolar air. It is a pure diffusion process. Thus through the alveolar air it is possible to determine the free acetone concentration in the blood.

On the Testing of Renal Efficiency with Observations on the "Urea Cœfficient." MACLEAN, H. and DE WESSELOW, O. L. V.: *Brit. Jour. of Exp. Path.*, February, 1920, Vol. I.

MACLEAN and Wesselow describe a new functional test for determining the ability of the kidney to concentrate urea. The test has been used with great satisfaction in over 1200 "persons suffering from the effects of war nephritis". The technique is as follows: After emptying the bladder the patient drinks 15 grams of urea dissolved in 100 c.c. of water. The patient then voids at the end of one hour and likewise in two hours; the percentage concentration of urea being determined in each specimen separately. Normal kidneys should concentrate urea above 2 per cent. If the concentration falls below 1·5 per cent. there is usually advanced functional disturbance.

Preservations of Blood Intended for Blood Sugar Determinations. DENIS, W. and ALDRICH, M.: *Jour. of Biolog. Chem.*, October, 1920, Vol. XLIV.

THE authors report that the addition of one drop of commercial "formalin" to 5 c.c. of oxalated blood will prevent glycolysis for ninety-six hours. Also it does not interfere with the accuracy of the sugar determination when done by Folin and Wu's method. This note would seem to have great practical application in the treatment of diabetes mellitus.

E. H. M.

Lethargic Encephalitis. BUZZARD, E. F. and GREENFIELD, J. G.: *Brain*, 1919, part 4, p. 305.

THIS contribution contains a recapitulation of two previous papers, already published in *The Lancet*, December 21st, 1918 and *Proc. Roy. Soc. Med.*, August, 1919, to which the authors have added recent observations and a description of the morbid anatomy.

The material on which they base their conclusions consists of a series of twenty-two cases, with five autopsies as well as a number of outside cases which were made use of for this work.

Emphasis is placed on the varying symptomatology in the involvement by a generalized inflammation of an organ whos functions are so numerous and the authors, at the outset, insist on the *impossibility of diagnosing the disease from the presence or absence of any symptom or group of symptoms*, and maintain that such diagnosis must, rather, be made from a consideration of the onset and course of the disease and by the elimination of other pathological conditions which may produce similar symptoms and physical signs.

They are content to divide the symptomatology into *three groups of cases*, which show characteristics, sufficiently distinct to merit consideration.

1. Cases characterized by hemiplegia, hemianæsthesia, hemianopia, etc.

2. Cases characterized by symptoms resembling those of paralysis agitans; the basal ganglia group.

3. Cases characterized by disturbance of the function of the cranial nerves.

They point out that these groups correspond to different anatomical levels of the brain and suggest the chief incidence of the inflammation in each of these levels, though clinical and pathological observations show that the disease is more widespread than might be suspected from the most prominent symptoms.

A further grouping is made to show the wide variation existing between the *severe* and *mild* types and due emphasis placed on the great number of the latter, *many of which must pass, unrecognized.*

The severe forms, which more often come to autopsy, would appear to fall under the class 3, where the chief incidence of the inflammation falls upon the cranial nerve nuclei, while in marked contrast, many cases have appeared in recent months which had never been considered seriously ill. These are characterized by the insidious onset of slight lethargy, disturbance of the sleep cycle, slight memory defect and alteration in temperament, while fleeting attacks of diplopia and general muscle stiffness may supplement the symptom-complex.

It is suggested that *the lethargy*, characterizing some cases may be attributed to a condition of hydrocephalus induced by inflammation and œdema in the region of the corpora quadrigemina, interfering with the circulation of the cerebro-spinal fluid.

Consideration is given to the late development of *involuntary movements*, affecting the limbs, jaw or tongue, which form interesting sequelæ of the more severe cases. These movements are sometimes irregular and choreiform, sometimes rhythmical and limited in their distribution, but vary so much as to render difficult any accurate description. They are in abeyance while the parts concerned are in voluntary use, more obvious when resting and cease altogether during sleep.

As to their pathogenesis, the authours incline to the view that they represent the release of some nervous activity by interference with control, rather than that they are the result of chronic irritation, and no attempt is made to correlate their occurrence with any local lesion.

In considering group 1 type of case, emphasis is placed on the difficulty of differentiating these cases from cerebral tumour, abscess or hæmorrhage and particularily from more subacute lesions such as abscess or syphilitic thrombosis.

As to *prognosis*, they say "Further experience may teach us more. At present we can only say that some cases recover completely, others survive the acute stage but carry with them in after life permanent defects, while a certain number die either from toxæmia or hæmorrhage in the acute illness or from some complication following it."

As to treatment, no method is suggested that might abort or cure the disease and from their experience, in four cases, they suggest that operative interference, in the way of decompression, is contraindicated in spite of the presence of increased intracranial pressure. Three of these cases, operated upon, died from hæmorrhage and it is hard to believe that decompression can be beneficial when this hæmorrhagic tendency exists.

A brief summary of the pathological findings given in order of the most constant occurrence is:

1. Vascular congestion.

2. Toxic degeneration of nerve cells and slight neuronophagy.

3. Proliferation of mesoblastic cells of the vessel walls and infiltration of the nervous tissue with these cells.

4. Small-celled infiltration of the Virchow-Robin space.

5. Glial proliferation.

Venous thrombosis and hæmorrhage were by no means constant findings. The former was more constant than the latter and these thrombi may occur in any vessel and in any region.

Hæmorrhage seemed to be due to two distinct causes, of which the commoner form is that where a ring of hæmorrhage surrounds a congested vessel, having broken into the perivascular space of His and, later, from pressure or fragility of glial tissue, into the tissues at some distance from the vessel.

The other form of hæmorrhage is due to infarction following upon arterial thrombosis. F. H. McK.

The Parkinson Syndrome in Encephalitis Lethargica. MARIE, PIERRE, and LEVY, C.: *Bull. de l'Acad. de Med.*, June, 1920.

THE author presents the differential diagnosis of postencephalitis parkensonian syndrome from true Parkinson's disease (paralysis agitans).

He begins with a discussion of the divergent views as to the location of the lesion in paralysis agitans, considered by some to be in the basal nuclei, particularily in the lenticular nucleus, while others believe it to be in the cerebral peduncles.

He first considers the age of onset. The Parkinsonian syndrome may appear at any age, most often between the age of twenty and forty while true Parkinson's disease rarely begins before the age of forty.

The association of the Parkinsonian syndrome with pre-existing infection is important.

In paralysis agitans the onset is described as "progressively hemiplegic", that is, it progresses slowly from one member to the other on the same side of the body.

No such mode is seen in the Parkinsonian syndrome where, on the contrary, the onset is abrupt and involvement of all the extremeties and body takes place at the same time.

The typical tremor of paralysis agitans is lacking in the Parkinsonian syndrome. In encephalitis the movements are of the nature of spasmodic jerkings, are of large amplitude and are not constantly in abeyance, during voluntary movement.

Finally and because of the widespread involvement of the brain stem in encephalitis, there are associated signs, such as arise from involvement of the tongue and masseter muscles which are not met with in paralysis agitans.

The course of the disease is also of importance, as in encephalitis the syndrome may completely disappear, while in paralysis agitans, no cure or abatement is seen.

The Cerebro-Spinal Fluid in Epidemic Encephalitis. BOVERI, PIERO: *Jour. Nerv. and Ment. Disease*, October, 1920, Vol. LII.

THE author reports his conclusions on the examination of sixteen cases of epidemic encephalitis, ranging in age from fourteen to sixty years. The examination was made, in each case, at intervals during the disease from the fifth to the thirty-fifth day.

Pressure. Slight increase in eight cases, normal in the others. The increase does not appear to bear any relation to the seriousness of the disease, but was at its height during the early and acute stage.

Colour. Always clear like pure water, no fibrinous deposit was seen.

Albuminoids (globulin and albumin). There is often a slight increase in albuminoids (about one-half of the cases) as tested by Cantaloube's albuminometer and the Nonne reaction, but never was there a strong positive reaction.

Reducing power. In general there is an increase in the reducing power of the liquid.

Cytology. Made by Nageotte's chamber, the cell count ranged from two to fourteen lymphocytes. Any increase occurs during the initial stage of the disease.

The slightest of the alterations and their uniformity in all phases of the disease are factors of great importance especially in view of the differential diagnosis of epidemic encephalitis from the different forms of meningitis, particularly tubercular and syphilitic.

Choreo-Athetoid and Choreopsychotic Syndromes as Clinical Types or Sequelæ of Epidemic Encephalatis. ARCHAMBAULT, LASALLE: *Arch. Neur. Psych.*, November, 1920, Vol. IV.

AN exhaustive clinical study of the incidence of epidemic encephalitis upon the basal ganglia and frontal cortical regions of the brain leads the author to recognize two distinct symptomological syndromes, representing each of these cerebral levels.

Recognizing with most previous writers, that the symptoms more commonly observed point to an especial prediliction for the pontopeduncular region and the basal ganglia, he carefully points out that the frequent occurrence of quite dissimilar, though almost equally typical, syndromes affords presumptive evidence that the histological changes may be disseminated throughout the entire nervous system, with focal predominance at any given level.

He further suggests that time will show that what is now regarded as the classic clinical physiognomy of the disease depends on the overwhelming preponderance of the lesions in the peri-ventricular gray matter, —the strio-thalamo-tegmental region.

Of many other less usual and less typical forms of the disease, he selects for special study two distinct symptomological groups which he designates as: (1) Choreo-athetoid and (2) choreopsychotic types.

While choreiform movements and psychotic manifestations have been referred to by various authors from the earliest accounts of the disease, they were regarded simply as one of many striking features in the clinical findings, but the author, in a series of sixty cases, found these manifestations sufficiently frequent and striking to justify him in recording them as special syndromes, representing a preponderating incidence of the infection upon special brain regions or levels. He furthermore emphasizes the belief that further intensive study, both anatomical and clinical, of this newly identified cerebrospinal affection, promises to elucidate the pathogenesis of many hitherto baffling neurological disorders, such as paralysis agitans, choreiform and athetoid states, endocrinal dysfunctions and even certain of the psychosis.

Nor does he disregard consideration of a classification, based on the course or evolution of the disease, as has been propounded by writers on this subject, though he suggests that many of the manifestations hitherto looked upon as sequelæ, attracting attention, as they often do, during convalescence or after the patient has been allowed to resume work, are really the expression of slowly evolving degeneration changes in the cellular complexes of the basal ganglia, engendered by a prolonged and stealthily increasing inadequacy of the vascular supply.

This, he believes, explains the frequent relapse of certain symptoms, commonly observed in patients who run a mild and supposedly abortive type of infection and is a manifestation of the essential chronicity frequently observed in the disease. Such late manifestations, occurring in the pseudoconvalescent stage of the disease, frequently presents the clinical picture of Parkinson's disease or the choreo-athetoid syndrome.

Representative of the choreo-athetoid syndrome, three cases are cited which within three months, following a typical attack of epidemic encephalitis, developed rhythmic oscillatory movements of the head and extremities, of unilateral distribution. The head slowly rotated from side to side, the mouth retracted and the face exhibited the expression of anxiety or distress. These spasmodic movements were essentially characteristic, being of the nature of athetosis in the face and neck and on the contrary, more closely analogous to choreiform jerkings in the extremities.

Under the choreopsychotic type four cases are detailed which, during the acute stage, exhibited a minimum display of the ordinary and more familiar manifestations of epidemic encephalitis, such as lethargy,

asthenia or typical ocular pareses, but later developed the striking features of choreiform twitchings and persistant psychotic disturbances, such as mental confusion, disorientation and hallucinatory delirium. These were singularly related to the usual work or occupation of the patient who persisted in the performance of his former habitual activities. Two of these cases terminated fatally.

In discussing the pathogenesis, the author draws a clinical analogy between these syndromes and the very similar symptomatic expressions of such diseases as paralysis agitans, Huntington's chorea, athetosis and progressive lenticular degeneration. He draws attention to the observations of J. Ramsay Hunt on the pathology of the corpus striatum, particularly with reference to the pathogenesis of paralysis agitans and cites his conclusion that there are two syndromes, resulting from elective cellular degenerative changes in the corpus striatum, namely chorea and paralysis agitans. He furthermore relates the findings of Marie and Lhermitte in several cases of Huntington's chorea in which they found chronic leptomeningitis, atrophy of the frontal lobe and massive atrophy of the corpora striata, more particularly the putamen, all resulting on slowly progressing but definite alterations in the vascular systems concerned.

Reasoning by analogy, he assumes that the pathology of epidemic encephalitis serves to confirm the actually favoured hypothesis, regarding the striatal origin of choreic and athetoid spasms. Similarly a predominating implication of the meninges and cortex of the frontal region is believed to be responsible for the psychotic form of the disease. One case of the choreo-psychotic syndrome group bore a striking resemblance to general paresis in which disease the maximum cortico-menengeal changes are distributed over the frontal lobes.

In conclusion, he reminds us that these syndromes *develop late in the course of the disease*, generally months after all acute manifestations have passed and reasonably assuming that encephalitis, like poliomyelitis, has existed in sporadic form for centuries, indicates the possibility of such an infection originating the degenerative changes that underlie such clinical symptom-groups as paralysis agitans, Huntington's chorea, athetosis, Friedriech's ataxia, multiple sclerosis and even dementia præcox and other psychoses. F. H. McK.

Glucose as an Adjunct in the Therapy of Pneumonia. John, H. J.: *Am. Jour. Med. Sci.*, October, 1920, Vol. 160, p. 542.

The authour reports observations on a series of 137 cases of broncho-pneumonia treated with repeated injections of glucose.

He uses a ten to thirty per cent. solution of chemically pure glucose, made up in distilled water and sterilized in the autoclave. During the febrile period, 250 c.c. of this solution are introduced into a vein twice or thrice a day. The injection is made slowly, from fifteen to thirty minutes being used for the above quantity. He adds to this solution 0.008 gm. of morphine sulphate and 0.00064 gm. of atropine sulphate as he finds that these drugs decrease the frequency of chills following the injection. Chills, however, follow 20 to 30 per cent. of the infusions but they are not of any serious import.

He notes the following results of the treatment: a refreshing sleep, lessened delirium, copious sweating and diuresis, and a lowered temperature. Besides giving an added amount of fluid the glucose provides a certain number of extra calories. The treatment should be begun early in the disease and digitalization of the heart may be carried out rapidly by adding the tincture (m.xv.) to the first four or five injections.

D. S. L.

The Management of the Heart in Pneumonia. Brooks, H. and Carrol, J.: *Amer. Journ. Med. Sci.*, December, 1920, Vol. 160, p. 815.

The authors emphasize the fact that a large proportion of pneumonia cases die a cardiac death, and that pneumonia is a two system disease (respiratory and circulatory).

The main cardiac lesion is an inflammation or degeneration of the cardiac muscle. The chief stress is placed on the right side of the heart, where the margin of reserve is slight as compared with that of the left side. The paramount factor in the prognosis is the ability of the right heart to resist the mechanical and toxic effects of the disease.

Failure of the right heart must be treated early and energetically if a fatal issue is to be avoided. Early recognition of right sided failure, however, is a matter of some difficulty, the cardinal signs are: unexplained increase in cyanosis, dyspnœa, and the appearance of substernal discomfort and of œdema of the lungs. A weakened pulmonic second is of importance. Increase of the præcordial dullness is to be made out at at times, but fluoroscopy offers the only certain method of recognition of early dilatation of the right auricle.

To offset the effects of this toxic mycocarditis, the authors place great faith in the exhibition of digitalis early in the disease, before the muscle has become seriously compromised. In the acutely ill they recommend 15 to 20 minims of the tincture every two or three hours till the rate is slowed, the pulse becomes fuller and the muscle sounds good. Failure of the right side is a signal for maximum doses of the drug.

In cases where the heart is seriously involved on admission they recommend the massive dosage of Eggleston.

Decreasing physical strain is of great importance and careless handling of the patient by too frequent examination and meddlesome therapy is deprecated. The avoidance of circulatory strain is carried on through convalescence, the patient being allowed out of bed only after a fortnight of normal temperature.

For emergency stimulation adrenalin has a place, but *only* as an emergency measure. The same applies to caffein and camphor.

Small doses of morphin and codein are useful, not only to quiet cough, but also to conserve the circulation by quieting the restless and delirious patient.

In a small group of cases venesection does good. In the plethoric and obese when the invasion is attended by intense cyanosis, dyspnœa and evidence of insufficiency of the right heart, blood letting gives great relief. Especially is this the case in the hypertensives. In the later stages it is rarely to be advised.

Finally the promotion of excretion by the kidneys and bowel, and the use of an easily combustible diet in which the carbohydrates play an important rôle, are points of great importance in the management of pneumonia. D. S. L.

The Influence of Protein Food on Increased Blood Pressure. MOSENTHAL, H. O.: *Amer. Journ. Med. Sci.*, December, 1920, Vol. 160, p. 808.

THERE seems to be a general impression that a low protein diet reduces the blood pressure. Mosenthal shows, however, that in cases of nephritis with moderate to severe grades of hypertension, neither a low nor a high protein diet has any regular effect on the systolic or diastolic pressure. True his periods were relatively short (four to twenty-seven days) but they always sufficed to produce large variations in the waste nitrogen products in the blood without any variation in the pressure.

From this work it would appear that we must look elsewhere for a method of controlling hypertension.

D. S. L.

Notes on the Ætiology of Goitre. BOITEL, M. W.: *Revue Médicale de la Suisse Romande*, November, 1920, p. 717.

IN an historical introduction the author points out that practically all our knowledge of goitre is due to the work of Coindet, who in 1819 discovered the action of iodine in goitre, of Kocher, of Reverdin, and others, who as early as 1882 described post-operative myxœdema, and showed that water causing goitre is rich in bacteria. All later work, both experimental and statistical, is disputed, and diametrically opposite conclusions have been reached.

After an extensive review of the various theories of its ætiology, in which infection, either water-borne or by contact, is given a prominent place; and of the view which attributes it to a lack of iodine in the system, he gives his own results.

From the records of Prof. C. Roux, at the Hospital of Lausanne, he made a study of 1308 cases, who came there during thirty years from the one canton of Vaud. These tend to show that the maximum number of patients came from the valleys and low-lying plains; while the minimum were found on the mountain slopes. Heredity was shown in 47 per cent. of cases. Although boiling the water has been recognized as preventing goitre, the distribution was entirely different from that of typhoid fever, a water-borne disease. There seem to be a slightly greater proportion of cases among the rural population than in the cities.

He considers that therapeutically iodine does not affect the cause of goitre, but only the symptoms, either by stimulating the impaired function of the thyroid, or by increasing the fluidity of its secretions and thereby favouring their absorption. The best method of administration is in small continuous doses,—as by painting on the tincture of iodine. Prof. Roux has advised keeping a bottle of this preparation uncorked in the room. Even a small quantity of iodine added to our table salt has been recommended as a means of prophylaxis. J. L. D .M.

Treatment of Gonorrhœal Arthritis by the Subcutaneous Injection of Liquid from the Joints. DUFOUR, H. and DEBRAY, M.: *Bulletins et Mémoires de la Société Médicale des Hôpitaux de Paris*, November, 25th, 1920, p. 1391.

THE authors report three cases of this acute condition treated by removal of fluid from one of the affected joints by means of a needle and a syringe, and the direct re-injection of 10 c.c. of this fluid under the skin of the thigh without any manipulation or sterilization of the liquid. There were no local or general reactions and the pain and swelling disappeared in a few days. J. L. D. M.

Three Cases of Late Jaundice Due to Salvarsan in Non-Syphilitic Patients. GOLAY, M. J.: *Revue Médicale de la Suisse Romade*, November, 1920, p. 764.

THE author reports three cases, from the Dermatological Clinic of Geneva, treated for other skin diseases

by a course of novo-arsenobenzol, and shown by history and blood-tests to be free from syphilis, in which jaundice developed in about three months after the cessation of treatment. From these cases and from previous work on syphilitic cases, he concludes that the late jaundice following the administration of salvarsan is a toxic hepatic jaundice, and is not due to syphilis, but rather to arsenical intoxication, which usually disappears without any specific treatment.

PÆDIATRICS

Some Phases of the Pathology of Nutrition in Infancy. MARRIOTT, W. MCKIMM: *Amer. Jour. Dis. of Children*, December, 1920.

SINCE the chief function of the infant is growth, it is not surprising that its nutrition should be the chief concern of those responsible for its welfare. Almost any factor, external or internal, which affects the infant at all has an influence on its nutrition. No organ or system in the body becomes affected without involving to some extent its general nutrition. A growing realization that it is the infant as an organic whole that must be considered rather than any individual organ has lead to a much broader conception of disease in infancy, and to a more rational therapy. The gastro-intestinal tract is only important because it exerts such a profound influence on general nutrition, and because diseases of this tract are a large factor in infant mortality. Czerny grouped the causes of nutritional disturbances under their main heads: Food, infection, and constitution. Granting the importance of these ætiological factors, we are still largely in the dark as to how each of them acts, and as to why infants suffering from nutritional disturbances should die. Very little information is obtained from the necropsy room. Finklestein and Meyer have emphasized the conception of food poisoning as a cause of nutritional disturbance; basing their belief on the fact that many of the symptoms are increased when more food is given. A careful search for toxic substances, hypothetic poisons elaborated from food during the processes of metabolism has failed to reveal any facts to support this theory. It seemed to the writer therefore important to search for other possible explanations of the observed facts, and in this paper he presents the results of the search and the conclusions he has drawn.

Two types of nutritional disturbances are considered: (1) The acute, in which the infant is suddenly attacked with symptoms of so-called alimentary intoxication: diarrhœa, vomiting, rapid emaciation; there is a short, shrill cry, a greyish pallor of the skin, a feeble pulse, and suppression of urine; coma or convulsions may close the scene. (2) The chronic form in which the infant gradually wastes; the subcutaneous fat is lost, and skin is dry and wrinkled; the colour is earthy, the features pinched; the abdomen distended; the appetite sometimes poor and at other times ravenous, but at no time does the child profit. This condition is generally referred to as one of malnutrition.

In the first class of cases one is struck by the great and rapid loss in weight; in some instances as much as half or even one pound in twenty-four hours. Nothing but loss of fluids can produce this loss. Experiments on dogs deprived of water show that the giving of food in this condition will produce diarrhœa and vomiting. Without a certain amount of water the digestive functions cannot go on. Thus Finklestein's problem is answered without the supposition of any special toxins. Following this idea we find that the loss of water will account for the diminished volume of blood, the lowered velocity of circulation, the sunken eyes and the greyish pallor. This last symptom is due to the entangling of the leucocytes in the capillaries, which have spasmodically contracted in an effort to conserve the volume of blood for central circulation. The air hunger suggests acidosis or uræmic poisoning.

This likewise is explained by loss of water. Czerny held that it was due to the production of abnormal acid. Keller was unable to find this acid. Steinitz thought it due to loss of bases. Holt and Fales demonstrated that this could not be the explanation. Howland and the author demonstrated the acidosis of the blood, but showed that it was not due to the overproduction of acid, but to failure in elimination of the acid phosphates by the kidneys, and that this was due to excessive water loss. Schloss confirmed this and showed that the lack of elimination was in proportion to the desication of the blood. The effect of water loss on the blood is to produce a concentration which gives rise to an increase in the specific gravity, in the corpuscular content, in the index of refraction in the protein content, in the viscosity and in the osmotic pressure. Starling has shown that increase of colloidal osmotic pressure beyond the arterial pressure in the glomeruli of the kidneys will induce a stoppage of secretion and bring on a condition simulating uræmia. Sometimes the administration of sodium bicarbonate will save these patients, but not infrequently it is insufficient. We must therefore look for some condition more than acidosis. Furthermore, looking at the patient we are struck with the resemblance to a case of shell shock. The greyish pallor, the thready pulse and the prostration point to diminished blood volume and flow, which of itself favours the accumulation of acid products. G. N. Stewart, by an ingenious application of the calorimetric method, found that the normal blood flow of 15 to 22 c.c. per 100 grams of body weight was reduced

to 2 or 3 c.c. Hence the failure of the alkaline treatment; sodium bicarbonate will not lower the osmotic concentration which is the factor inhibiting the action of the kidneys. Again, water evaporation is very great in infants; being 55 grams per kilo as compared with 22 grams per day per kilo in adults. As 30 to 40 per cent. of the heat loss of the body is due to evaporation, it follows that with impaired evaporation in this anhydremic state the temperature must rise.

This conception of the cause of the fever in these cases is supported by experiments showing a 600 per cent. increase in water elimination due to a rise in the temperature of the air from 20° C. to 36° C. This great loss in weakly infants may precipitate a crisis and probably accounts for the rapid increase in gastro-intestinal troubles during a spell of hot weather; in children kept in a hot and dry room this rapid desication may give rise to what is called heat stroke.

To sum up, the entire clinical picture may be explained by loss of water and the basis of our treatment should be to supply this water to the organism. Other factors may exist, but they are subordinate. In moderate cases fluids given by mouth will soon rectify conditions, but when vomiting and diarrhœa are present this is impossible, and the intravenous and subcutaneous channels must be employed. Sometimes the loss is so great that these are insufficient, so following an English method the writer has introduced large amounts of normal saline into the peritoneal cavity with excellent results. Ringer's solution, and dilute seawater have been used in some cases as substitutes. Dehydration beyond a certain limit causes such a destruction of body cells as to make recovery impossible. The presence of glucose in the system spares protein destruction, so glucose in solution given intravenously may be of definite value, but care must be exercised to keep below the limit that will produce glycosuria. Glucose may also be given intraperitoneally, but this method is liable in some instances to produce a distressful distention.

In regard to the second type, in which we have to deal with a chronic derangement of nutrition, the condition appears to be one of diminished volume and flow of blood, and is brought on by prolonged undernutrition. This occurs frequently in the presence of an excess of food. The reason for this is the inability of the patient to secrete a sufficient quantity of acid in the stomach to digest cow's milk. This permits bacterial invasion of the upper digestive tract and is unfavourable to the action of the curd-splitting ferment; it also gives a slower pyloric reflex, and fails to stimulate the flow of bile and the secretion of the hormone, which calls forth the pancreatic and intestinal ferments.

Cow's milk is shown to require three times the acidity needed to digest human milk; hence the inability of some infants to digest it. The recommendation in these cases is lactic acid milk, or protein milk, or well diluted cow's milk with the calories generously made up by carbohydrates. To make up for tissue loss, as much as 150 to 200 calories per kilo of body weight is advised to be given. The protein in some cases may be reduced to 10 per cent. of the caloric intake with only enough fats to supply vitamines. As dextrin is less liable to produce fermentation and gastro-intestinal disturbances, this form of carbohydrate is advised. Recently water soluble B. vitamines have been added with good effect. In these cases, although the food seems to agree, days may elapse before there is any gain in weight. The author follows the case by checking the index of refraction, the volume of the blood, and the rate of its flow. If these show improvementhe awaits with patience the recovery in body weight He sums up the causes of the two types of mal-nutrition as being due, first to lack of water, and second, to lack of nourishment. W. E.

The Use of the "Auto-Urine Reaction of Wildbolz in Tuberculous Children." ELIASBERG, H. AND SCHIFF, E.: *Monatschr. fur Kinderl.*, October, 1920, Vol. XIX, No. 1, p. 5.

The reaction consists of the subcutaneous injection of evaporated urine from suspected subjects. It is based on the observation of Wildbolz that tuberculous patients excrete a tuberculin-like substance in the urine, which if injected subcutaneously gives rise to a reaction similar to that produced by tuberculin. The writers consider that this reaction if positive indicates the presence of active tuberculosis. The advantages claimed for this method are that it is specific and that unlike the injection of tuberculin, its use is not likely to be followed by the activation of a latent process or by the development of miliary tuberculosis. A. G.

The Deaf Child. GOLDSTEIN, M.A.: *Laryngoscope*, 1920, Vol. XXX, No. 8, p. 479.

GOLDSTEIN claims there is but one form of training for the congenitally deaf child and that is the purely oral method. First the child is taught speech and then lip-reading. As the child's brain is receptive at three, deaf children in the Oral School at St. Louis receive instruction at three and a half years of age. He finds most deaf children who are taught by oral methods become good lip-readers. Some congenitally deaf children are at ten or twelve years of age brilliant, fluent lip-readers. It is easier to teach fluent lip-reading than to train a child in intelligible, normal speech.

Children who have acquired speech, even at an early age, before they become deaf, have indeed a great asset and every effort should be made to conserve every vestige of speech. The child who has never heard the sound of human voice is a difficult pedagogical problem. The writer recommends the use of the term "speech-reading" or "expression reading" to lip-reading, as the method depends not on the reading of the lips alone. He strongly advocates for the adult deaf, one uniform system of teaching lip-reading, which should contain the best of all the recognized methods as the Mueller-Walle, the Nitchie, etc.

In New York City there are two excellent Oral Schools for the education of deaf children.

D. H. B.

Le Rôle du Medecine dans L'Œuvre de la Puericulture. ROHMER, P.: *Archives de Medecine des Enfants*, October, 1920.

IN 1913 there was in France a mortality, during the first year of life, of 83,000, with a birth registration of 746,000. In 1911 the rate was 743,000 and the infant mortality 117,000. The author attributes the decrease in mortality to the inauguration of milk stations. He does not think the 1913 figures will be improved until breast feeding is more universally employed. He considers breast milk the ideal food for the infant, because amongst the poorer and less intelligent proletariat the artificial method of feeding permits of too many potentially disastrous errors.

H. P. W.

Some Peculiarities in the Symptomatology of Childhood. WILCOX, H. B.: *Arch. of Pædiatrics*, October, 1920.

THE infant frequently shows great variations in temperature from causes, which, in the adult, would have little or no effect. High elevations may accompany mild disorders where there is no disease. In very young infants a high temperature with great irritability and prostration is as frequently associated with lack of fluids and foods as with any serious bodily lesion. When the normal water reserve is reduced fevers result, because of the lack of water available for evaporation at the normal body temperature. In adults this only takes place when the fluids have been previously reduced to a minimum.

Convulsions are less common during the first four months than in the later months of infancy. This is due to the imperfect development of the nervous system. They become more common when the afferent and efferent tracts and lower centres are matured, but not controlled by co-ordination of the high centres. In this way he accounts for birth traumatisms not giving symptoms till long after they take place.

He draws attention to the gradual reduction in size of the heart compared with the body. Exactly proportionate to this is the decrease in the speed of the circulation and heart. The heart is transverse at birth and the left border of it remains outside the nipple line, with the apex in the 4th space, until the fourth year. From the fourth to the ninth year the apex moves downward and inward to the adult position. The transverse position of the heart during the early years accounts for the apex beat being displaced upward and outward rather than downward and outward, as in the adult, if hypertrophy or dilatation have taken place.

The most striking feature of the child's heart is its recuperative power. On this account compensation may often be established after most serious breakdowns. On the other hand, alarming evidences of circulatory failure may accompany insignificant and transient disease.

The results of physical examination of the lungs of the child are somewhat different to those found in the adult. These are partly due to the thin elastic chest walls and partly to the relatively larger space occupied by the bronchial tree. Breathing is louder, expiration more nearly equal to inspiration, and has a broncho-vesicular quality. Relative dulness is normal at the right apex owing to the arrangement of the underlying bronchus. Intensified breath sounds at the apex are also more prominent than in the adult. Owing to this quality lesions in the apex may be more readily made out in the axilla.

Acetonuria often receives unwarranted attention in children. The latter often turn promptly to the oxidation of their stored fats. If there is not sufficient carbohydrate to complete their oxidation, acetone bodies result. This is seen especially in respiratory toxemias.

A. B. C.

Tuberculous Infection and Resistance in Infancy, Childhood and Adult Life. CUMMINS, S. LYLE: *Internat. Jour. Public Health*, September, 1920.

THE writer, in seeking information on tuberculosis, quotes Nageli and Burkhardt, who give the results of post-mortem examinations in a long series of patients dying from all causes. These show that tuberculosis is extremely rare in infants and in young children, but becomes increasingly common with advancing age. Hamburger in his more recent work shows also by the post-mortem method results similar on the whole. Cummins quotes some of these in the following table:

	0–3 mos.	4–6 mos.	7–12 mos.	1–2 yrs	3–4 yrs	5–6 yrs	7–10 yrs	11–14 yrs
Total post-mortems...	105	73	140	179	175	67	65	44
With tbcs. lesions.....	4	13	32	74	102	38	41	31
Tuberculosis %.....	4	18	23	40	60	56	63	70
Post-mortems on cases dead of non-tuberculous disease.....	102	60	114	126	106	44	37	28
No. with tuberculosis as cause of death.....	4	13	27	51	69	23	28	16
% Deaths from Tbcs..	100	100	80	70	67	60	68	50

These figures, while showing higher percentage of tuberculous infection in infancy than previously recorded, confirm the figures of other observers. The lowest line of the table clearly shows the mortality is in inverse ratio to the age, *i.e.*, in the first few months, when the disease is rarest the mortality (100%) is highest and diminishes with age. Tuberculin reactions tell the same story as shown by von Pirquet and others. Metchnikoff, Burnet and Tarassevitch have had similar experience among Tartars, as the following table shows:

VON PIRQUET TESTS AMONG KALMONK TARTARS

		Children		Men
	0–5 yrs.	6–10 yrs.	11–15 yrs.	
	% positive	% positive	% positive	% positive
Central districts (isolated).....	13	32	56	64
Peripheral districts (contact with Russians...	30	63	83	89

The writer considers as "virgin soil" both infants and primitive tribes not in contact with civilized people. He also attributes the great resistance of most people in infected communities to immunity acquired in previous contact with the disease. Finally, all these figures confirm the belief that infection and mutual interaction explain the facts (without heredity).

F. M. F.

Cæliac Infantilism, Its Fat Digestion and Treatment by Bile Salts. MILLER, WEBSTER AND PERKINS: *The Lancet*, October 30th, 1920.

CÆLIAC disease shows three cardinal features: (1) Enlargement of the abdomen without signs of organic disease; (2) Persistent or relapsing diarrhœa with pale fatty stools; (3) Retardation of physical growth and development. The stools are usually large, liquid, pale and offensive, and the dried fæces may contain 50 per cent. or more of fat. Moreover, the condition is not one of deficient fat-splitting, but rather one of deficient fat-absorption. There is no case on record in which the digestion of fat was so defective as to point to pancreatic insufficiency. Although the cause of this fat wastage is quite obscure, the authors decided to test the value of bile salts in promoting the absorption of fat. They gave one grain each of sodium glycocholate and sodium taurocholate (in an alkaline watery solution flavoured to disguise the intense bitter taste) three times daily with the meals. During the administration of bile salts the stools became drier and firmer and there was a definite improvement in the splitting, absorption and utilization of fat. At the same time there was an increase in the patient's weight. Such results were more striking during the stages of active diarrhœa, for during the quiescent periods fat absorption tends to automatic improvement.

The protocols of three cases are given with analysis and tables showing the results of fat metabolism both with and without the administration of bile salts. These results would certainly justify the trial of bile salts (or desiccated pig bile) in a condition so obstinate as cæliac disease.

L. M. L.

A Treatment for Colic in Breast-fed Infants. GRULEE, C. G.: *Jour. Amer. Med. Assoc.*, November 25th, 1920.

THERE is scarcely any condition affecting breast-fed infants more common than colic. While it does not materially injure the infant *per se*, it is nevertheless of importance owing to the disturbance to the household and because it is so often made an excuse for premature weaning.

Colic should be regarded as a symptom of overfeeding. This is generally due to an over-abundant milk supply although some hold that it is due to an excessive amount of fat in the milk. The condition nearly always is accompanied by pain and an accumulation of gas in the bowel. These symptoms are associated with fermentation and irritation of the intestine. The latter is generally due to excessive fatty acids. Grulee's plan is to change the fermentation so that lactic acid, which is non-irritating, may result, and to encourage putrefaction, which is antagonistic to fermentation.

If the child is getting too much milk the period of nursing is shortened. This simple procedure is not sufficient to cure many of the cases. When necessary he gives 5 c.c. of the liquid culture of active lactic acid bacilli morning and evening, and each breast

feeding is preceded with a gram of powdered casein. When the latter cannot be obtained he administers the curd from an ounce of skimmed milk.

Occasionally the colic is due to a deficient amount of breast milk. Here supplemental feedings of protein milk are indicated. A. B. C.

The Early Orthopædic Treatment of Infantile Paralysis. SEGG, ARTHUR T.: *Boston Med. and Surg. Jour.*, November 25th, 1920.

THE paper consists of a short statement of the methods of treatment found most successful in caring for the 1916 epidemic in Boston, and is based on a careful study of more than one thousand cases.

It is recommended that orthopædic treatment should begin as soon as the acute and febrile symptoms have subsided, in order to protect as early as possible the stretching of weakened muscles by their opposing groups. Active treatment by massage and exercise is not to be undertaken until the sensitive stage has passed. When there is extensive involvement the recumbent position should be maintained for two to three months. To allow the patient to sit up early is a mistake and results in deformity. For the same reason walking should not be allowed until the muscles have regained power sufficient to carry out their movements easily. The children should not be urged to walk. The cases most restricted showed the best recovery.

After the period of sensitiveness has passed, massage and muscle training are instituted, avoiding fatigue. To guide this properly an accurate diagnosis of the muscles involved is necessary. F. A. C. S.

Pathological Anatomy and Pathogenesis of Congenital Occlusions of the Small Intestine. ROCHET, Ph. and WERTHEIMER, P.: *Lyon Surgical*, September, October, 1920.

THE paper presents a discussion of the way by which these defects arise. A pathological description of three cases which has recently come under the author's notice is given. All three showed mucous membrane lining a blind end both above and below the occlusion; while the muscularis and submucosa are continuous through the occluded section. The intestine above is dilated; the portion below is not only small, but retarded in its development, resembling the intestine of a four months' fœtus. After discussing various theories which have been suggested to account for the condition, the authors state their belief that the weight of evidence supports those theories which depend on a defect of development (Mackel, Tandler, Farstner). Early in embryonic life the small intestine is found as a thick homogeneous tube. The subsequent history shows two stages: The first is characterized by proliferation of endodermic tissue resulting in the blocking of the lumen by a solid plug of epithelial cells. The second is a phase of mesodermic activity in which this plug is invaded, vacuolated and by the coalesence of these vacuoles the lumen is restored. The failure to complete this latter process would explain the conditions found. The article is interesting, well worked out, and well worth reading. F. A. C. S.

A Note on the Dissemination of Spirochæte Pallida from the Primary Focus of Infection. BROWN W. H., and PEARCE, LOUISE: *Arch. of Derm. and Syph.*, October, 1920.

EXPERIMENTAL work on rabbits shows that there is probably no appreciable time during which spirochætal infection is confined to the focus of entry. The conclusion drawn is that as soon as the spirochætæ enter the tissues, they begin to multiply and gain access to the lymphatics and blood stream, and are distributed over the body even before the initial lesion is noted. H. E. M.

On the Treatment of Lupus Vulgaris by the Liquid Acid Nitrate of Mercury. ADAMSON, H. G.: *Brit. Med. Jour.*, July 24th, 1920.

THE author speaks of a large number of cases which cannot be reached by the Finsen method or *x*-rays, and claims that we must still rely on older methods of cauterization, with or without scraping. He has used various caustics; among others, caustic potash, which acts well on the lupus nodules, but is apt to damage surrounding healthy tissue; and chloride of zinc which does not destroy neighbouring tissues to the same extent.

Recently, however, he has found the liquid acid nitrate of mercury more efficacious and rapid in action than any other caustic he has come across, and is surprised that it should have received so little attention up to the present. The cases he has treated with it have been of the following types: (1) Single small patches of non-ulcerating lupus. (2) Old cases of lupus, already treated, but with nodules still recurring. (3) Large ulcerated patches. (4) The common widespread type involving the nose, palate, lips and cheeks. The application is made with a swab of wool wrapped around a fine-pointed forceps. He paints freely for one or two minutes, keeping carefully to lupus nodules and patches, or ulcerated surfaces. No dressing is applied. A crust forms a few days after application, and in about a week this comes

away, often leaving a healed surface. Sometimes a single application removes a lupus nodule, but one or two more may be necessary. There is a good deal of pain, especially some time after the application; in very widespread cases, involving the nasal passages, a general anæsthetic may be given; otherwise, small areas may be done at a time.

He does not claim complete cure, but thinks that the good results he has had justify a more general use of this remedy. H. E. M.

DERMATOLOGY

Malignant Degeneration in Benign Dermatoses. Williams, C. M.: *Arch. of Derm. and Syph.*, August, 1920.

The writer thinks it impossible, at present, to estimate what dermatoses most frequently become malignant, but in reviewing them, he comments as follows:—

Vascular nævi never become malignant. As regards the pigmented type, opinions differ as to which kind degenerates. Bloodgood holds that it is the projecting type; Pusey thinks rather that it is those that are embedded. No statistics are available to decide the point, but Williams thinks it reasonable to remove projecting moles which are most liable to trauma. Electrolysis or freezing may be employed.

Senile keratomata are the most important as starting points for carcinoma, while statistics again are not available, the sequence is so frequent as to be noteworthy.

He points out the frequency of cancer of the mouth arising on the site of pre-existing leukoplakia, but does not conclude that the latter gives rise to cancer. Syphilis and tuberculosis very frequently lead to malignancy. The scarring of syphilitic ulcers of the tongue may lead to carcinoma of that region, but elsewhere, malignancy does not seem to follow the condition. He concludes that many causes lead to keratoses, which may show a tendency to undergo malignant degeneration. R. E. MacD.

Action of Radium on a Variety of Cutaneous Conditions. Montgomery, D. W.: and Culver, G. D.: *Arch. of Derm. and Syph.*, October, 1920.

In the experience of these two investigators, radium gave prompt relief and cure in persistent fissures of the nares, lips and anus; favourable results were also noted in lupus erythematosus. In dystrophy of the nails, in seborrhœic eczema and in psoriasis there was marked restoration of healthy growth, and it also relieved the itching and induration of chronic eczema. R. E. MacD.

Post-Mortem Report on Case of Lupus Erythematosus. Low, R. C. and Anderson, R.: *Brit. Jour. of Derm. and Syph.*, November, 1920.

A detailed post-mortem examination was made in a patient with long standing lupus erythematosus, particular care being taken as regards the presence of any tuberculous infection. No evidence of tuberculosis could be found.

The patient suffered from chronic bronchitis and had foci of suppuration in the teeth. The writers comment on the fact that both the removal of the decayed teeth and the administration of vaccine containing streptococcus longus, improved the lupus. R. E. MacD.

Protein Sensitization in Eczema. Rannitz, M. A. *Arch. of Derm. and Syph.*, September, 1920.

Of seventy-eight cases of eczema treated with proteins, thirty gave positive skin tests, nineteen of the most ordinary foods being employed. Treatment lay in removing the food producing the reaction. Improvement was noted in the first week. In the cured cases no recurrence had been noted within one year. R. E. MacD.

Treatment of Leprosy with the Dean Derivatives of Chaulmoogra Oil. Macdonald, J. T. (Director of Leprosy Station, Kalihi Hospital, Honolulu): *Jour. Amer. Med. Assoc.*, November 27th, 1920.

Dr. MacDonald reports that since October, 1918, his hospital has discharged seventy-eight cases who are "no longer a menace to the public health". These have shown no recurrence to date. Their average stay in hospital was fifteen months. Dr. MacDonald and his associates have reached the conclusion that the nearest approach to a specific for leprosy lies in chaulmoogra oil or oil of gynocardium. It has been long used, but in the researches of Dr. A. L. Dean, of the University of Hawaii, and his colleagues, the ethyl esters of the fatty acids of the oil were used, and these placed the treatment on a far more certain basis. Treatment was given both intramuscularly and by mouth, the injection being regarded as the more important of the two. Emphasis is laid on the necessity of treating this disease in hospital, on account of the length of time required, the value of the encouragement patients gain by seeing others cured, and the degree of control that can be employed in keeping the patients segregated. The Dean derivatives have not yet been prepared in large enough quantities for general distribution. R. E. MacD.

News

ALBERTA

At the annual meeting of the Alberta Medical Association held September 22, 1920, Dr. Chas. Hunter of Winnipeg gave a clinic at which four patients suffering from endocarditis were presented. In two, diagnosed as belonging to the infective or malignant type, the disease began in France with fever, pain in the pericardium, and weakness. When presented at the clinic, there was marked enlargement of the heart in one case, but not in the other. In both a double murmur existed. Albumen and blood were present in the urine of both patients. There was also marked clubbing of the fingers and toes. No leucocytosis was present in either case. Osler's spots were present in one of the cases. These are small spots which vary in size from a pin's head to that of a small pea, and may or may not be raised above the general level of the skin. They vary in their hue of colour; the smaller and redder are generally seen in the fingers and toes. These spots are regarded as diagnostic of an infectious endocarditis. The diagnosis of an infectious endocarditis is made from the following symptoms and signs:

Fever which may be moderate; pallor, and wasting; aortic diastolic murmur and high pulse pressure is very suggestive; albumen and blood in the urine; clubbing of fingers and toes, and the presence of Osler's spots. Infective endocarditis may be present in the absence of fever, leucocytosis, positive blood culture, and enlargement of the spleen. These patients are very apt to develop signs of cerebral embolism, or infarcts in kidney or spleen.

The third patient had had an acute arthritis. Examination revealed signs of a mitral and aortic lesion, but there was no fever or enlargement of the spleen. The evidence of a valvular lesion, with a history of an acute arthritis justified a diagnosis of simple endocarditis.

The fourth patient had had an acute arthritis as the result of wnich a mitral lesion had developed. He had also been subject to fainting spells. Dr Hunter was satisfied that the fainting spells were not cardiac in orgin. He also expressed his opinion that dizziness as an isolated symptom was of no significance. He pointed out that in congenital heart disease a definite thrill was often present over third left intercostal space.

MANITOBA

The annual meeting of the Manitoba Medical Association was held at Winnipeg on November 17th, 18th and 19th and undoubtedly was the most successful convention yet held in this province. An intensive clinical drive of highly interesting cases was planned for one large meeting and maintained on schedule time daily from 9 a.m. to 12 with surprising success. At 12.30 p.m. by special arangement a buffet lunch was served after which the afternoon sessions were opened at once and carried through with crowded audiences.

The papers presented showed careful preparation and in several cases were followed by animated discussion.

The following papers were presented:

"Scope and Relations of Pysychiatry." Dr. C. B. Farrar, Ottawa.

"Diagnosis and Treatment of Tumours of the Urinary Bladder," E. J. Boardman, Winnipeg.

"Tuberculosis in a Prairie Province—A study in ætiology." D. A. Stewart, Ninette.

"Blood Transfusion," S. J. S. Pierce, Brandon.

"Acidosis, its Diagnosis and Treatment," C. R. Gilmour, Winnipeg.

"Drainage in Surgery," J. Halpenny, Winnipeg.

"The Value of Fluroscopy in the Diagnosis of Abdominal Conditions," L. J. Carter, Brandon.

"Serous Meningitis," Wm. Boyd, Winnipeg.

Books Received

HYGIENE OF COMMUNICABLE DISEASES. A Handbook for Sanitarians, Medical Officers of the Army and Navy and General Practitioners. By Francis M. Munson, M.D., Lieutenant Medical Corps, U.S.N., retired. 793 pages with illustrations. Price, $5.50. Publishers: Paul B. Hoeber, New York, 1920.

THE FORM AND FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM. Introduction to the study of Nervous Disease. By FREDERICK TILNEY, M.D., Ph.D., professor of neurology, Columbia University, and Henry Alsop Riley, A.M., M.D., associate in neurology Columbia University. 1020 pages; 591 figures containing 763 illustrations of which 56 are coloured. Price $12.00 Publishers: Paul B. Hoeber, New York, 1921.

Book Reviews

DIAGNOSIS AND TREATMENT OF BRAIN INJURIES. By WILLIAM SHARPE, M.D., professor of neurological surgery, New York Policlinic Medical School and Hospital. 757 pages, 232 Illustrations. Price $8.00 Publishers: J. B. Lippincott Co.

THE book is divided into three parts. In Part I is given a general discussion of the symptoms and signs of brain injuries, together with a detailed description of the method of examination recommended by the author. In chapters V and VI of this section the text for the whole work is set forth. This may be given in the author's own almost monotonously recurring phrase. "The proper use of the ophthalmoscope, and the measurement of the intraspinal pressure by means of the mercurial monometer." On the accuracy of his observations in the employment of these instruments the value of the book rests. By the proper use of the ophthalmoscope is meant the frequent examination of the fundi and the recognition of changes in the discs of less degree than that usually described as optic neuritis or chocked disc. These changes range from swelling of the veins, through blurrings first of the nasal, then of the temporal side of the disc, up to swellings of two diopters or more at which point the term choked disc is used. Such changes indicating increased intracranial pressure are stated to be found in 33 per cent. of head injuries; and, if supported by an increased intraspinal pressure are recommended as the guide indicating in what cases and at what stage of the case operative measures are to be undertaken. An intraspinal pressure of over 16 mm. of mercury as compared to a normal 5-9 it is stated calls for cranial decompression.

The reviewer feels sure that a similar class of cases examined at the Royal Victoria Hospital has shown so many exceptions to the reliability of the intraspinal pressure as an indicator of the danger from intracranial pressure, and so much uncertainty in justly estimating slight disc changes even by experienced ophthalmologists, that the slavish following of such guides would not be a safe practice.

Part II consists largely of the case histories of 130 patients who have suffered from brain injuries. About one-third were operated on either in the "acute" or "chronic" stages in accordance with the indications as detailed in Part I. The case reports are interesting, but too numerous to discuss. Part III deals with cranial injuries in new born babies, and older children. Spastic

paralysis and defective mental development especially if progressive are stated to be due in many cases to a chronically "wet" or œdematous brain, the result of old intracranial hæmorrhage.

F. A. C. S.

HYGIENE OF COMMUNICABLE DISEASES. A Handbook for Sanitarians, Medical Officers of the Army and Navy and General Practitioners. By FRANCIS M. MUNSON, M.D., Lieutenant Medical Corps, U.S.N. retired. 793 pages with illustrations. Price $5.50 Publishers: Paul B. Hoeber, New York, 1920.

THIS work presents in a concise form the information now available on the epidemiology and management of communicable disease.

Part I deals with epidemiology, prophylaxis and sanitation. It includes chapters on the infecting and infesting agents, infection and immunity, dissemination and general prophylaxis, etc. It also deals with personal, military and naval hygiene and includes many of the lessons learnt during the war.

Part II considers in detail the different maladies, their causes and treatment.

The book will prove useful for ready reference, more or less complete information being easily available on all communicable forms of disease.

F. G. F.

THE SYSTEMATIC TREATMENT OF GONORRHŒA IN THE MALE. By NORMAN LUMB, O.B.E., clinical assistant, St. Peter's Hospital for Stone. Second edition, 123 pages. Price $1.75 Publishers: Lea & Febiger, Philadelphia and New York, 1920.

THE second edition of this extremely interesting booklet appears in slightly enlarged and improved form. In it the author describes his routine methods of examination and treatment of gonorrhœa in the male. The book outlines in a very excellent manner the treatment of an acute case, while the description of complications and of methods of examination and treatment of a chronic case is well done. Urethroscopic examination is dealt with by the author in another excellent book entitled: "The Urethroscope in the Diagnosis and Treatment of Urethritis". Two particular points are worthy of more extended comment. First: in acute cases, the irrigation treatment alone is recommended, according to the methods which have been in force in the British Army in recent years. Second: the use of vaccines is recommended equally in the acute and chronic stages of gonorrhœa. The author states that his view has been confirmed by an experience of some thousands of cases. He points out the difficulty of destroying by ordinary methods of treatment those gonococci which lie beneath the mucuous membrane of the urethra and its numerous glands, and urges that vaccines, by increasing the bactericidal power of the blood are the best mediums for this purpose. He uses a mixed stock vaccine composed of many strains of staphylococci and gonococci. In this respect, the discovery by Thomson of a method of rendering gonococcal vaccines less toxic, and so permitting the injection of much larger quantities, may be of the utmost clinical importance in the treatment of gonorrhœa. This method depends upon the fact that gonococci are readily soluble in an alkaline medium. The toxin, which is an endotoxin is removed by dissolving in an alkali thoroughly emulsified cultures and reprecipitating them by neutralization. The precipitate consists of the gonococcus stroma less the endotoxin, which when injected gives rise to very little reaction. Injections are made commencing, with 2,500 millions and increasing to 10,000 millions. Clinical tests with detoxicated vaccines are so far very satisfactory, although the results in chronic cases using polyvalent vaccines have not been so striking.

F. S. P.

CARE AND FEEDING OF INFANTS AND CHILDREN. A Text-Book for Trained Nurses. By WALTER REEVE RAMSEY, M.D., associate professor of diseases of children, University of Minnesota. Including Suggestions on Nursing by Margaret B. Lettice, supervising nurse of the Baby Welfare Association. Second edition revised, 290 pages, with 123 illustrations. Price $2.50. Publishers: J. B. Lippincott Co., Philadelphia, London, and 201 Unity Building, Montreal, 1920.

THIS book which is intended for use as a text-book by nurses, is now in its second edition. The chapters on artificial feeding and general hygiene are exceptionally good. The chapter on child welfare has been entirely rewritten. The illustrations are numerous and excellent. We note with some surprise that in the technique for vaccination it is recommended the scratching be continued until the wound bleeds. This book will prove a valuable addition to the library of any nurse.

G. A. C.

SHORT TALKS ON PERSONAL AND COMMUNITY HEALTH. By LOUIS LEHRFELD, A.M., M.D., agent for the prevention of disease, Department of Public Health, Philadelphia. 271 pages. Price $2.00 net. Publishers: F. A. Davis Company, Philadelphia, 1920.

THIS volume consists of health talks, arranged in a short, concise manner in popular form, free from technical terms, so as to be readily understood by the average person of school intelligence. It is not intended, primarily, for physicians, but those who are engaged in public health work might find some help in perusing its pages. Today, when we are all more or less interested in housing problems, and in child welfare, in efforts to prevent occupational and infectious diseases—in attempts to prevent industrial accidents—and in mental hygiene, this book appears at a very opportune moment.

The different subjects are discussed in a very short manner, but we recommend it heartily to physicians engaged in public health work, to public health nurses, and social workers.

G. S. M.

ANÆSTHETICS, THEIR USES AND ADMINISTRATION. By DUDLEY WILMOT BUXTON, M.D., B.S. Sixth edition, 548 pages. Price 21/–net. Publishers: H. K. Lewis & Co. Ltd., London, 1920.

IN this work, Dudley Buxton, covers his subject in an excellent manner so that the most learned would do well to read it carefully. Particular attention may be drawn to those parts dealing with shock with nitrous oxide-oxygen in major surgery, and with medico-legal aspects. There is one branch of anæsthesia in which his teachings are wanting, that of nitrous oxide-oxygen in obstetrics; very little space is given to this, whereas it is worthy of extensive discussion because it has occupied a most prominent part in the literature of recent years. In this connection he suggests the apparatus of Teter as modified by Gwathmey when there are other mechanisms more applicable.

W. B.

WANTED

at once, an unmarried physician on the medical staff of the Nova Scotia Sanatorium, Kentville, N.S. Apply for full particulars to MEDICAL SUPERINTENDENT.

In Arteriosclerosis, Anasarca, Cardiac Insufficiency, Etc.

DIURETIN Tablets, 8 grains each

Vascular Remedy and Heart Tonic

DOSE: From 5 to 15 tablets daily, depending upon nature of case

Sold through the Drug Trade

Tubes of 20 or bottles of 50 tablets each.
Also in Glass-stoppered vials of 1 oz. powder.

Further information and literature from

E. BILHUBER, Inc.

45 John Street - NEW YORK

REGULIN

Presents a new principle in the conquest of chronic constipation—that of treating the bowel contents rather than the bowels themselves. Corrects the physical condition of the intestinal mass – restores its normal bulk and softness—and the bowels resume their natural functioning. REGULIN is a true bowel corrective.

SEND FOR SAMPLES TODAY

REINSCHILD CHEMICAL CO., 47-49 Barclay Street, New York City

Trade and samples supplied by Lyman's Limited, Montreal

paralysis and defective mental development especially if progressive are stated to be due in many cases to a chronically "wet" or œdematous brain, the result of old intracranial hæmorrhage.

F. A. C. S.

HYGIENE OF COMMUNICABLE DISEASES. A Handbook for Sanitarians, Medical Officers of the Army and Navy and General Practitioners. By FRANCIS M. MUNSON, M.D., Lieutenant Medical Corps, U.S.N. retired. 793 pages with illustrations. Price $5.50 Publishers: Paul B. Hoeber, New York, 1920.

THIS work presents in a concise form the information now available on the epidemiology and management of communicable disease.

Part I deals with epidemiology, prophylaxis and sanitation. It includes chapters on the infecting and infesting agents, infection and immunity, dissemination and general prophylaxis, etc. It also deals with personal, military and naval hygiene and includes many of the lessons learnt during the war.

Part II considers in detail the different maladies, their causes and treatment.

The book will prove useful for ready reference, more or less complete information being easily available on all communicable forms of disease.

F. G. F.

THE SYSTEMATIC TREATMENT OF GONORRHŒA IN THE MALE. By NORMAN LUMB, O.B.E., clinical assistant, St. Peter's Hospital for Stone. Second edition, 123 pages. Price $1.75 Publishers: Lea & Febiger, Philadelphia and New York, 1920.

THE second edition of this extremely interesting booklet appears in slightly enlarged and improved form. In it the author describes his routine methods of examination and treatment of gonorrhœa in the male. The book outlines in a very excellent manner the treatment of an acute case, while the description of complications and of methods of examination and treatment of a chronic case is well done. Urethroscopic examination is dealt with by the author in another excellent book entitled: "The Urethroscope in the Diagnosis and Treatment of Urethritis". Two particular points are worthy of more extended comment. First: in acute cases, the irrigation treatment alone is recommended, according to the methods which have been in force in the British Army in recent years. Second: the use of vaccines is recommended equally in the acute and chronic stages of gonorrhœa. The author states that his view has been confirmed by an experience of some thousands of cases. He points out the difficulty of destroying by ordinary methods of treatment those gonococci which lie beneath the mucuous membrane of the urethra and its numerous glands, and urges that vaccines, by increasing the bactericidal power of the blood are the best mediums for this purpose. He uses a mixed stock vaccine composed of many strains of staphylococci and gonococci. In this respect, the discovery by Thomson of a method of rendering gonococcal vaccines less toxic, and so permitting the injection of much larger quantities, may be of the utmost clinical importance in the treatment of gonorrhœa. This method depends upon the fact that gonococci are readily soluble in an alkaline medium. The toxin, which is an endotoxin is removed by dissolving in an alkali thoroughly emulsified cultures and reprecipitating them by neutralization. The precipitate consists of the gonococcus stroma less the endotoxin, which when injected gives rise to very little reaction. Injections are made commencing, with 2,500 millions and increasing to 10,000 millions. Clinical tests with detoxicated vaccines are so far very satisfactory, although the results in chronic cases using polyvalent vaccines have not been so striking.

F. S. P.

CARE AND FEEDING OF INFANTS AND CHILDREN. A Text-Book for Trained Nurses. By WALTER REEVE RAMSEY, M.D., associate professor of diseases of children, University of Minnesota. Including Suggestions on Nursing by Margaret B. Lettice, supervising nurse of the Baby Welfare Association. Second edition revised, 290 pages, with 123 illustrations. Price $2.50. Publishers: J. B. Lippincott Co., Philadelphia, London, and 201 Unity Building, Montreal, 1920.

THIS book which is intended for use as a text-book by nurses, is now in its second edition. The chapters on artificial feeding and general hygiene are exceptionally good. The chapter on child welfare has been entirely rewritten. The illustrations are numerous and excellent. We note with some surprise that in the technique for vaccination it is recommended the scratching be continued until the wound bleeds. This book will prove a valuable addition to the library of any nurse.

G. A. C.

SHORT TALKS ON PERSONAL AND COMMUNITY HEALTH. By LOUIS LEHRFELD, A.M., M.D., agent for the prevention of disease, Department of Public Health, Philadelphia. 271 pages. Price $2.00 net. Publishers: F. A. Davis Company, Philadelphia, 1920.

THIS volume consists of health talks, arranged in a short, concise manner in popular form, free from technical terms, so as to be readily understood by the average person of school intelligence. It is not intended, primarily, for physicians, but those who are engaged in public health work might find some help in perusing its pages. Today, when we are all more or less interested in housing problems, and in child welfare, in efforts to prevent occupational and infectious diseases—in attempts to prevent industrial accidents—and in mental hygiene, this book appears at a very opportune moment.

The different subjects are discussed in a very short manner, but we recommend it heartily to physicians engaged in public health work, to public health nurses, and social workers.

G. S. M.

ANÆSTHETICS, THEIR USES AND ADMINISTRATION. By DUDLEY WILMOT BUXTON, M.D., B.S. Sixth edition, 548 pages. Price 21/–net. Publishers: H. K. Lewis & Co. Ltd., London, 1920.

IN this work, Dudley Buxton, covers his subject in an excellent manner so that the most learned would do well to read it carefully. Particular attention may be drawn to those parts dealing with shock with nitrous oxide-oxygen in major surgery, and with medico-legal aspects. There is one branch of anæsthesia in which his teachings are wanting, that of nitrous oxide-oxygen in obstetrics; very little space is given to this, whereas it is worthy of extensive discussion because it has occupied a most prominent part in the literature of recent years. In this connection he suggests the apparatus of Teter as modified by Gwathmey when there are other mechanisms more applicable.

W. B.

WANTED

at once, an unmarried physician on the medical staff of the Nova Scotia Sanatorium, Kentville, N.S. Apply for full particulars to MEDICAL SUPERINTENDENT.

In Arteriosclerosis, Anasarca, Cardiac Insufficiency, Etc.

DIURETIN Tablets, 8 grains each

Vascular Remedy and Heart Tonic

DOSE: From 5 to 15 tablets daily, depending upon nature of case

Sold through the Drug Trade

Tubes of 20 or bottles of 50 tablets each.
Also in Glass-stoppered vials of 1 oz. powder.

Further information and literature from
E. BILHUBER, Inc.
45 John Street - NEW YORK

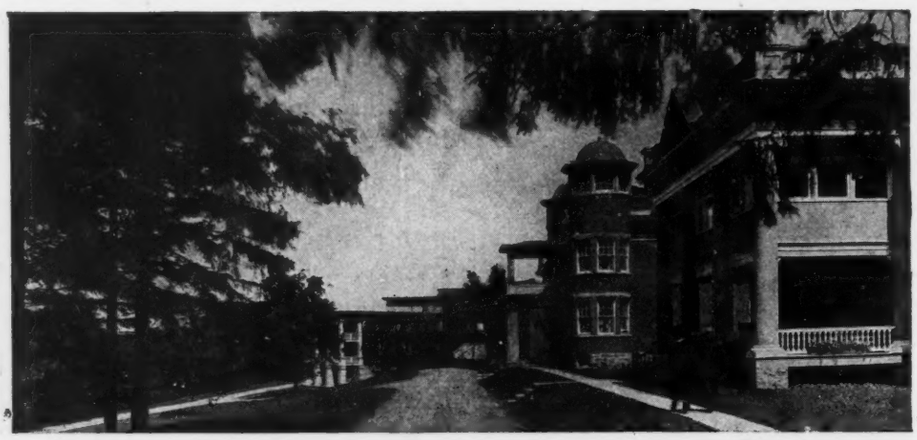
REGULIN

Presents a new principle in the conquest of chronic constipation—that of treating the bowel contents rather than the bowels themselves. Corrects the physical condition of the intestinal mass — restores its normal bulk and softness—and the bowels resume their natural functioning. REGULIN is a true bowel corrective.

SEND FOR SAMPLES TODAY.

REINSCHILD CHEMICAL CO., 47-49 Barclay Street, New York City

Trade and samples supplied by Lyman's Limited, Montreal



HOMEWOOD SANITARIUM

GUELPH, ONTARIO

For Nervous and Mental Diseases and Selected Habit Cases.

Seven New Buildings, four of which are residential.

Grounds comprise 75 acres of woods and lawns.

Recreation: In Summer—Golf, Tennis, Lawn Bowling, Croquet and Quoits. In Winter—Gymnasiums, Bowling Alleys, Billiards, Skating, Skiing, Snowshoeing and Tobogganing.

Diversions—Occupational Rooms, Music Rooms, and Library.

Treatment—Daily Medical Attention, Hydrotherapy, Electricity and Massage. A complete surgical suite and laboratory is maintained. Careful subdural, intravenous and intraspinus treatment given to all mental patients where Wassermann and other tests are positive.

Accommodation—Single Rooms, Room with Bath, or Complete Suites. **A Good Cuisine.**

GUELPH is situated on the Grand Trunk and Canadian Pacific Railways, seventy miles from Niagara Falls.

Rates are reasonable. For information apply to A. T. HOBBS, Medical Supt.